International Institute for
Applied Systems Analysis
IIASA www.iiasa.ac.at

An Economic Analysis of Agriculture and Industry in the Skane Region

Stroemqvist, U.

IIASA Collaborative Paper
February 1983

AN ECONOMIC ANALYSIS OF AGRICULTURE AND INDUSTRY IN THE SKÅNE REGION

Ulf Strömqvist*

February 1983

CP-83-15

*TEMAPLAN AB
Lila Skuggans vag 18
S-11549 Stockholm, Sweden

Consultant to the Southwest Skåne
Intermunicipal Association (SSK)
Malmö, Sweden

INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS
A-2361 Laxenburg, Austria

PREFACE

In 1979 the Regional Development Group at IIASA became engaged in a case study of economic and demographic development, land-use and related problems in the region of southwestern Skåne in Sweden. The case study is the third in a series of attempts made by the group to apply systems analytic methods to regional planning problems in regions with different economic structures, resource endowments and organizational settings.

The research in the Skåne study was done in collaboration with the Intermunicipal Association of Southwest Skåne, as a part of their ongoing work in physical and public transport planning for the metropolitan region of Malmö, and its neighboring municipalities. The research was partly sponsored by the Swedish Council for Building Research.

In the study an integrated package of models has been used. The models have been developed within the Regional Development Group in cooperation with a group of Swedish researchers and planners. In that package, separate models have been developed for interregional economic and demographic problems, and the intraregional land-use problems.

The current collaborative paper represents one of the central background materials for the study. Since the Skåne region is specialized in agricultural production as well as in food and chemical industry production, a quite detailed analysis of the structure and prospects of those industries is needed to provide a solid foundation for the comprehensive economic and land-use modeling. That analysis must also embrace the alternative industrial development options. Thus the paper

contains an economic analysis of agriculture and industry as a whole in the Skåne region.

Ulf Strömqvist has structured his economic analysis in a novel way. Rather than building the analysis on average data, the author stresses strongly the importance of tracing out the distribution of production units along a profitability scale. The dynamics of these industrial profitability patterns are at the core of the analysis.

Utilizing a general method for identifying and describing structural invariances of production systems, this analysis with its considerable originality, is an important part of the southwest Skåne case study. It also has a substantial independent interest.

Börje Johansson
Acting Leader
Regional & Urban Development Group

February, 1983

CONTENTS

AN ECONOMIC ANALYSIS OF AGRICULTURE AND INDUSTRY IN THE SKANE REGION

Ulf Strömqvist

1. INTRODUCTION

1.1 Some Backgrounds of the Study

Skane has a unique role in the Swedish economy through its proximity to Sweden's most important international markets. This advantage is not utilized. A large fraction of the Skane economy is not exposed to international competition. This affects capital formation as well as employment, and land-use.

The absence of international competition in Skane's resource use places the region in a development mode to make it insensitive to the changes in international markets. This does not only mean that Skane is protected from external economic recessions. Ita also implies that the Skane economy is not structurally revewed in the pace set by the dynamics of international markets.

More than half of the resource use in the region's economy is not operating under world market competition. The international dependence is considerably higher in the rest of Sweden despite a less advantageous location relative to the main communication networks.

There is a strong interrelation between the private and public parts of developed economies. An increased level of capital formation in the private sphere generally leads to rising

claims for public capital formation. The same is true for employment. A weak international dependence in the Skane economy entails that a smaller share of the public sector decisions are motivated or influenced by international factors. The long-term consequences of these weak external links tend to become especially serious for the transport networks in the region, and for educational as well as research and development activities in the area.

Since the Skane economy is mainly directed towards domestic markets, special interest should be attached to the development of agriculture and industry in Skane in relation to the rest of Sweden. These comparative-advantage considerations should primarily relate to:

- o production structure, resource use, and commodity exchange,
- o productivity and cost structures,
- o capital formation and profitability patterns.

Private production and resource use in Skane, and in the rest of Sweden, may be crudely summarized in six different sectors: agriculture, food industry, equipment industry, other industry, commercial activities, and forestry. In these economic sectors public production is negligible. Talbe 1 contains a rank order of the sectors in question according to the level of international dependence.

Table 1. Composition of the Skane economy and that of the rest of Sweden, 1979 (percentage distribution of production).

Sector	Skane (percent)	Rest of Sweden (percent)
Agriculture	9	3
Food industry	21	8
Trade	20	9
Other industry	33	39
Equipment industry	17	29
Forestry	0	2
TOTAL	100	100

The first three sectors in Table 1 have an extreme direction towards local and other domestic markets. In Skane these three sectors make up 50 percent of gross production. The corresponding volume in the rest of Sweden is 30 percent. The relation between domestically and internationally oriented economic activity becomes even clearer if the labor factor is considered, see Table 2.

Almost 60 percent of the work-places in sectors with no public production are found in economic activities oriented towards local and domestic markets in Skane. This is considerably higher than the domestic orientation in the rest of Sweden.

Using the same categorization of sectors, Table 3 shows that in the rest of Sweden two thirds of the capital stock are given to sectors operating in international competition. In Skane more than half of the production in the same sectors goes to domestic markets.

Table 2. Distribution of employment among economic activities in Skane and the rest of Sweden, 1979 (percent).

Market orientation	Skane (percent)	Rest of Sweden (percent)
Sectors mainly producing for domestic markets	58	41
Sectors exposed to international competition	42	59
TOTAL	100	100

Table 3. Distribution of private capital stocks in Skane and the rest of Sweden (percent).

Market orientation	Skane (percent)	Rest of Sweden (percent)
Sectors mainly producing for domestic markets	55	33
Sectors exposed to international competition	45	67
TOTAL	100	100

If land-use is considered, the picture becomes even clearer as can be seen in Table 4. In Skane almost two thirds of the land are used for domestically oriented production. In the rest of Sweden, the corresponding share is ten percent.

For each production unit in the economy it is possible to compute benefits and costs as well as productivities and profits.* The production value is often measured as sales value or value added. The sales value is a gross concept which denotes the value of the total sales of the production unit in question. The value added is a net concept. It is computed as the sales value minus costs for current consumption, i.e. for raw materials, intermediary goods, energy, packaging materials, hired transport services, etc.

The value added must cover the costs for the use of labor. Alfter labor costs have been paid a gross profit remains which is to cover the costs for depreciation, working capital, and other fixed costs. What then remains is a net profit which may be used as returns to owner-capital.

If gross profits are negative the fixed costs of production cannot be covered. Instead, a gross deficit will occur. For production units exhibiting such deficits basically two alternatives are present:

Table 4. Distribution of land among economy sectors in Skane and the rest of Sweden (percent).

Market orientation	Skane (percent)	Rest of Sweden (percent)
Sectors mainly producing for domestic markets		
Sectors exposed to international competition		
TOTAL		

*For an elaboration of these concepts, see Johansson and Stromqvist (1980, 1981).

- reduction of the level of operation or close-down;
- covering of the deficit from the funds of the firm owning the production unit, or from the public.

Sometimes the deficits may be decreased or removed with reorganization or investments.

Productivity is usually defined as value added per worked hour or per employed. In most production units productivity is higher than labor cost per employed. Larger periods of cyclic market growth and capital formation with result in industries getting a skewed distribution of productivity and thus of the capability to cover the costs of labor. This holds for industry as a whole as well as for individual sectors. The skewed shape of the distribution of productivity may be illustrated as in Figure 1 for the whole of the Skane industry. The figure shows the productivity in each production unit, according to a ranking along a productivity scale, as a function of the cumulative share of the total industrial employment.

During the years just before and after 1980 the non-profitable part of Skane's industry has take up some ten percent of the employment. Non-profitable means that those units have a productivity level not exceeding the labor cost. The operation of these units gives rise to a deficit already before any of the fixed production costs have been included in the profitability analysis.

In the industrial sector in Skane there are also a large number of units, size measured in terms of employment, where gross profits are very thin. These units make up for another ten percent of the total employment.

If industrial productivity in Skane is compared to the one in the rest of Sweden it appears that the curve for Skane dominates the other one. A closer comparison reveals that Skane's industry has i) the largest value added per employed, ii) the most rapid increase in that ratio during the period 1968-1979, iii) the lowest share of employment in non-profitable units during the late 1970s. The subsidized food industry, and the chemical industry, primarily contribute to these favorable conclusions.

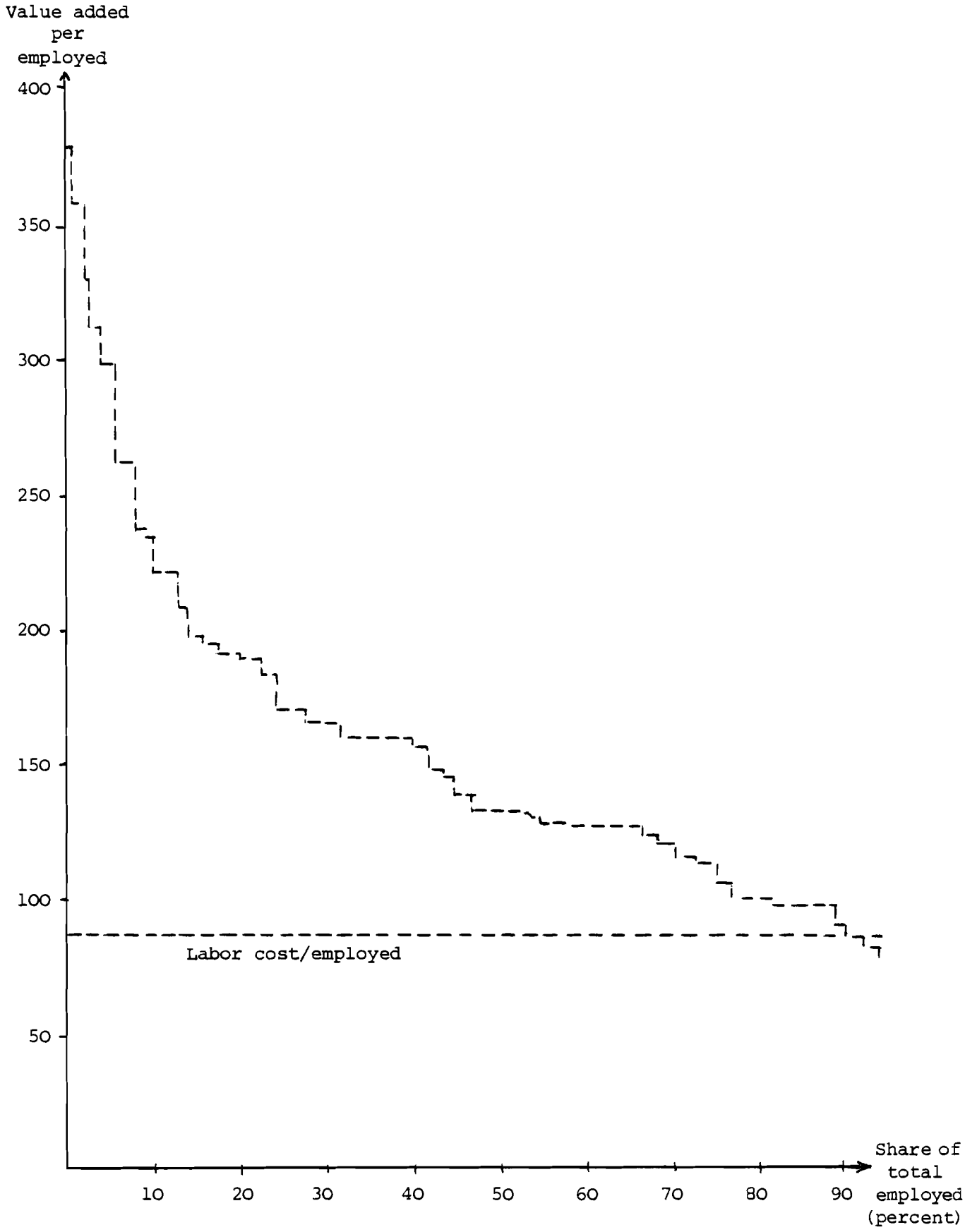


Figure 1. Productivity distribution in the Skane industry, 1979 (production units with at least five employed).

A reasonable scenario for the industry in Skane during the 1980s is that the low-productive work-places shown in Figure 1 are removed. Their employment is between 25000 and 35000 persons. A balanced structural change would call for a creation of equally many new or renewed work-places. This would demand an investment share of value added of at least 15 percent. During the 1970s that ratio has not exceeded 12 percent.

This structural change presupposes a change in land-use for the Skane industry. It is not reasonable to assume that the land demands for 25000-35000 new work-places correspond exactly to the land-use of ones shut down. A freedom of action for the new industry to choose efficient locations is therefore needed if the structural change process is going to proceed in the tracks sketched here.

The 1980s seem to provide bleak market forecasts for the agroindustrial complex in Skane. That complex contains crop and meat production, food industry, and parts of the chemical industry and the whole-scale sector. There is thus a need to reduce the production capacity. The structural change necessary in the context would involve a shut-down of some 12000 work-places during the 1980s.

The agricultural sector in Skane has shown a high investment activity in the 1970s. Rising excess supply of agricultural and food products indicate that this process cannot continue. A reduction of public activity foreseen in basically all political circles also would entail a reduction in investment activity. If these stagnation trends are not compensated by an increase in industrial investment in Skane in the 1980s, a market reduction in capital formation cannot be avoided.

The profitability of industrial activity can be defined in various ways. As indicated earlier, Skane's industry exhibited a profitability advantage in relation to the rest of Sweden in the 1970s of some 10 percent. An illustration of these facts, measured in gross margins, is given in Figure 2. Gross margins are defined as the gross profit share of value added or total sales. The figure shows the distribution of gross margins in Skane, and Sweden as a whole, along a similar scale to the one given in Figure 1 although

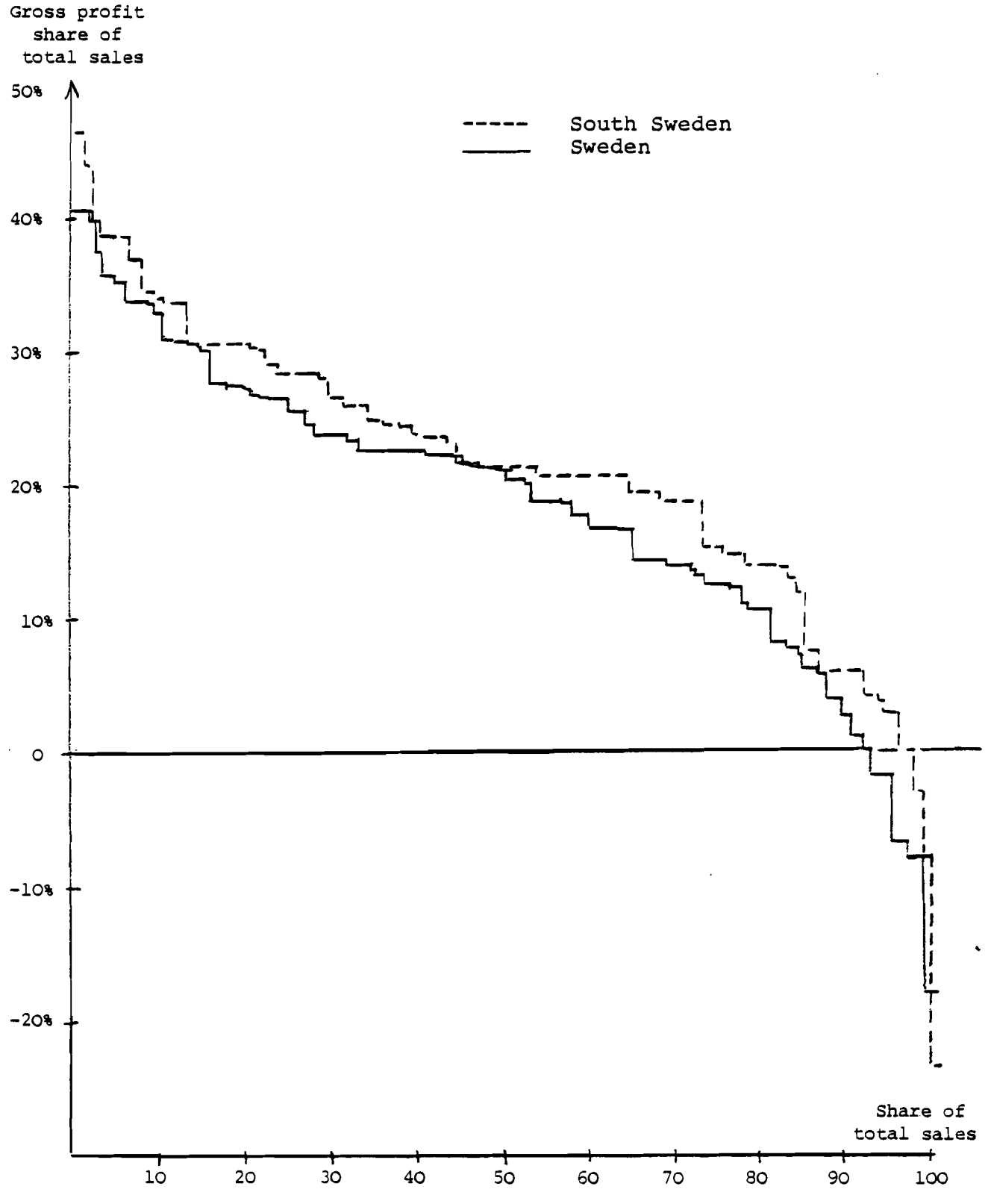


Figure 2. Distribution of gross margins in Skane's and Sweden's industry during the late 1970s.

in cummulative shares of the total value added or the total sales in the industrial sectors the figure clearly shows that gross margins in Skane (a part of South Sweden) are higher than in Sweden as a whole for all profitability classes.

Structural change proceeds simultaneously through shut-downs of obsolete production units and through introduction of new ones via investments. Normally, new or renewed workplaces will be provided with the best technology available. This imples that the new or renewed units will have productivities normally exceeding the average one for the existing units.

This process can be illustrated via Figure 3 in which a dynamic structural change process is illustrated.* That figure is a simplified version of Figure 1, already described above. Existing units are ordered according to the productivity levels. The curves then become monotonously decreasing. Renewal implies that production units with best-practice technology will replace obsolete units which are then shut-down. The pace in this structural change process is determined by the development of production costs and the intensity of the flow of innovations.

If shut-downs are more frequent than renewals the wage-payment capability will increase at the same time that the industrial employment will tend to fall. This has been the case in Skane's industry in the 1970s. The renewals have been too few to compensate the necessary market exits.

To a certain extent the potential shut-downs have been delayed by heavy subsidizing. One example here is provided by the shipyars.

A corresponding illustration of the importance of structural change can also be made for the land-use component. Such an analysis would be especially fruitful for the agricultural sector, pointing at its necessary adjustment to domestic and international market conditions. Even for this sector subsidizing may prevent a necessary structural change. The subsequent insensitivity to market signals may lead to increased demands for public interaction in a longer perspective.

---

*See also Strömqvist and Karlqvist (1982).

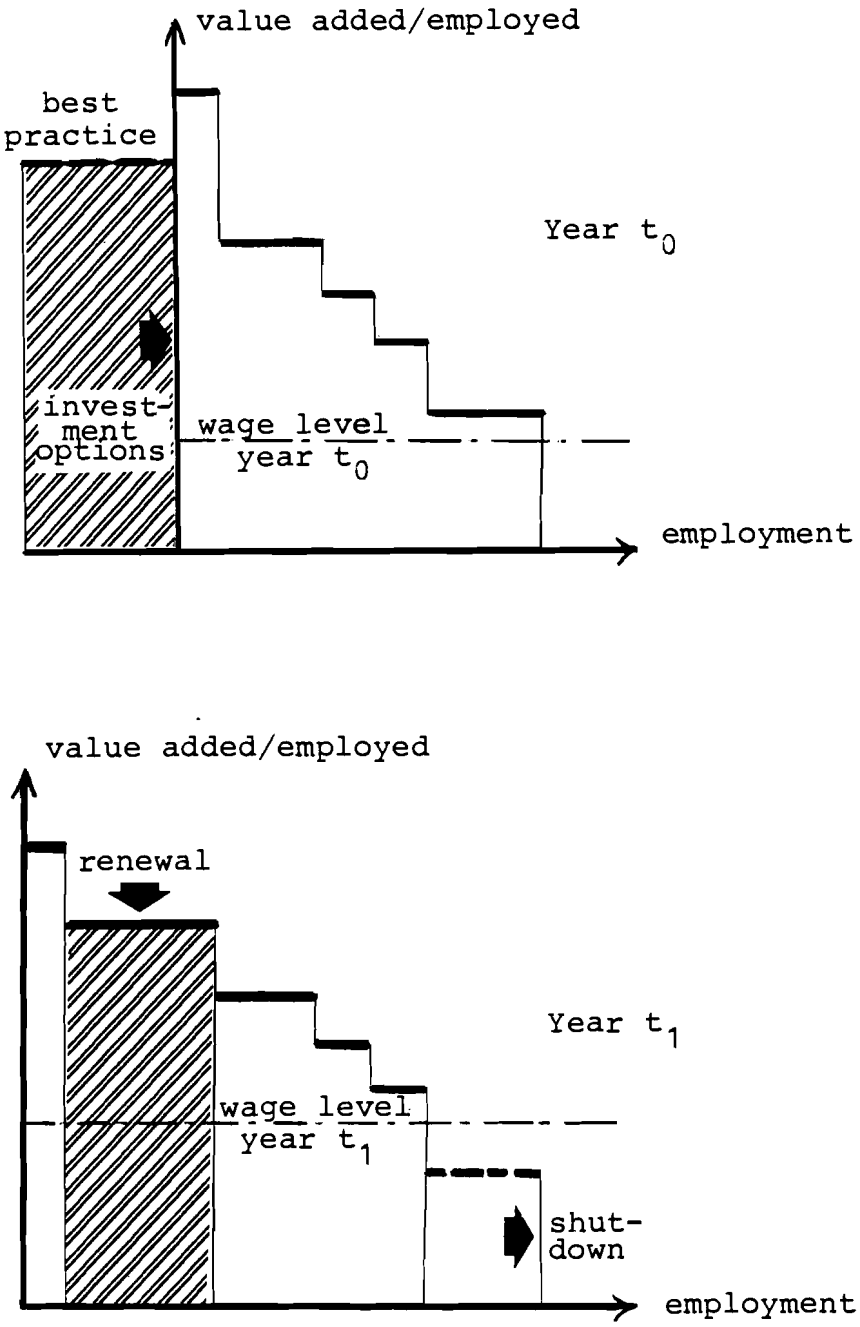


Figure 3. Illustration of a dynamic structural change process.

The analyses to follow rest on the concepts and basic background information about Skane given above. After a further elaboration on the role of the agroindustrial complex in Skane's economy, we will analyze the internal economic and spatial structures of the most important parts of the economy of Skane sector by sector. Each chapter will be concluded by a summary of basic facts. The analyses and conclusions rest on statistical data

for Skane's industry for the twelve-year period, 1968-1979. The scenarios discussed mainly relate to the development in the 1980s. Some qualitative analyses are also provided for the period up to the year 2000.

1.2 The Agro-Industrial Specialization of Skane

A major part of the market-oriented Skane economy can be summed up as an agro-industrial complex. As an economic unit this sphere of integrated sectors of production forms a regionally concentrated part of the Swedish economy, which during the latter half of the 1970s employed roughly (and depending on definitions) 70,000 to 80,000 people.

In terms of economic geography the agro-industrial complex of Skane is held together to a considerably higher degree than for example the Swedish forest industry, which also forms an integrated sphere of production with its raw materials, manufacturing units, and complementary production.

An integrated regional industrial complex is often a growth pole. The comparative advantages of such a system do, as a rule, lead to growth, the main limitation of which is defined by the development on the output market. Herein we identify a problem of development. The Skane agro-industry, in the broad sense of the term, is not adapted to an expanding section of the world market but to a rather limited domestic market. At the same time the system is not subject to an international market competition in terms of price and quality. Thus the system tends to encourage permanent expectations on prices, quality, costs and profits.

Further, you might assume an established industrial complex to be less attractive to sectors, which cannot profit from the mutual advantages of the integrated sphere of production. Production in "alien" sectors instead has to compete about manpower, capital, land and various production services on unequal market terms. A well-developed industrial complex can in this

way hinder structural change and development towards other expanding markets. The base of the Skane agriculture consists mainly of its highly productive crop production, which during the seventies made up more than one third of the value of the national crop production. Four major economic sectors might be said to form an integrated agricultural sector: crop and meat production, food industry and considerable parts of the chemical industry. Partaking of this structure are also an extensive wholesale trade with food and agricultural products and an important greenhouse production. Figure 4 shows a rough picture of the most important production links.

Figure 4 summarizes the most important production links as they are manifested by the shipment flows. The energy use and the production resources land and capital of the various sectors also have to be added to these dependencies.

In the following we shall first report in detail on the characteristics of the various sectors of production within the agro-industrial complex of Skane. The emphasis of this report will be on production structure, productivity, location pattern and land use plus profitability and capital formation. Secondly, we shall summarize the most important production characteristics of the agro-industrial complex.

The report is commenced by a somewhat broader survey of the agricultural sector of Skane, followed by the crop sector, the meat production and the greenhouse trade. Then the food industry and the chemical industry will be treated. Even if only parts of the chemical industry can be directly related to agriculture, in the broad sense of the term, we have chosen to treat the chemical industry in this way.

The extensive internal production links within the chemical sector motivate the dedication of one entire section to this sector. Other industries, in particular the equipment industry, provide an alternative to the specialization towards agriculture-oriented industry in Skane. The positive national forecasts, for equipment industry in particular, motivate the reporting on other industry in Skane also in the context.

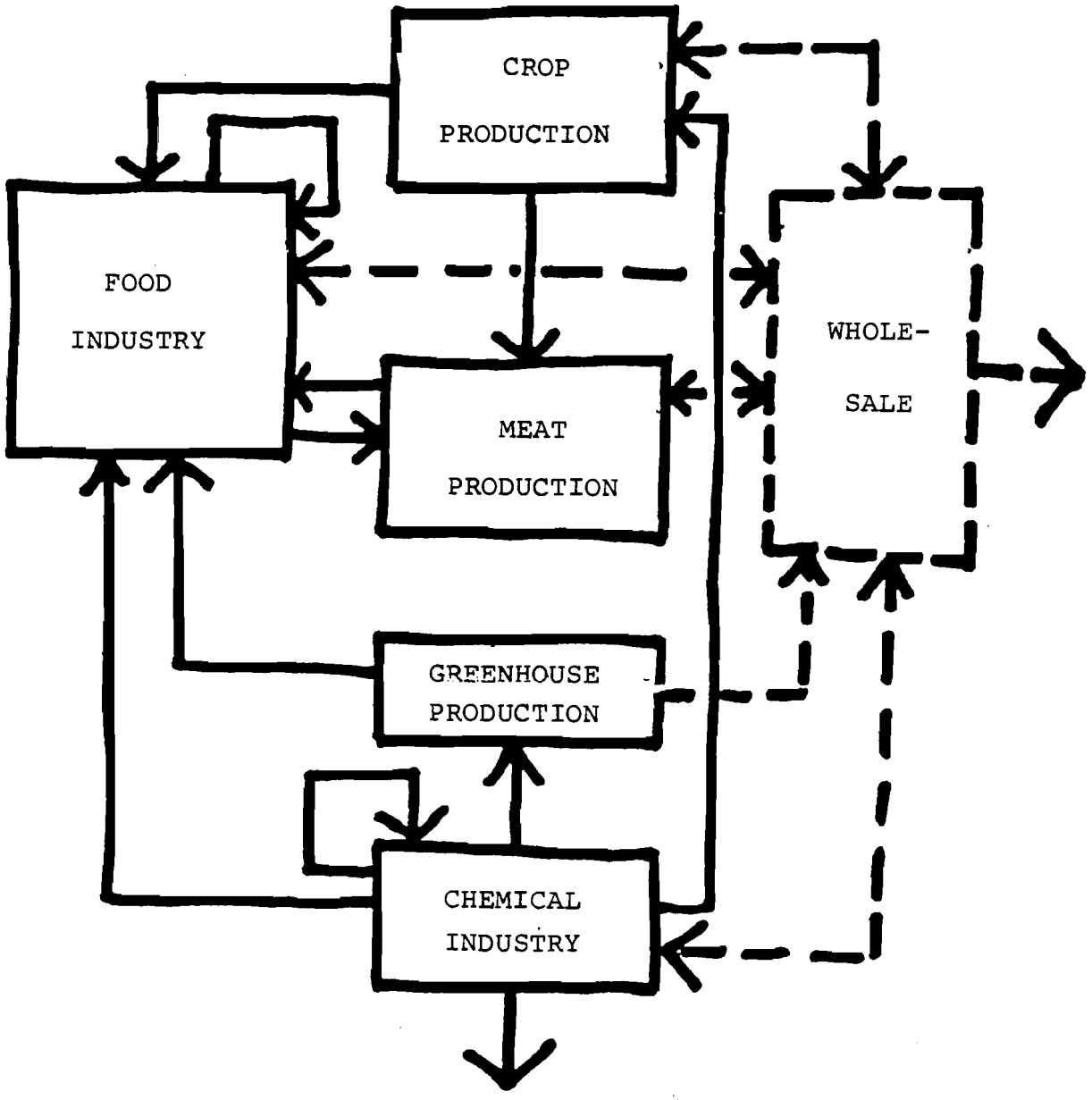


Figure 1. Production links in the agro-industrial complex of Skane.

2. AGRICULTURE IN SKANE

2.1. Swedish Post-War Agricultural Policies

The changes on the world market and the Swedish agricultural policies have since the beginning of the 1950s governed the development of the Swedish agricultural structure in easily discernible paths. For the period of 25 years between 1950 and 1975 some of the most significant paths can be summed up as follows:

- The area under cultivation decreased by 18 percent
- The agricultural employment decreased by 70 percent
- The mean area under cultivation per production unit increased by 80 percent
- The share of the so-called cultivated area independent of livestock increased by 30 percent.

During the same period the Swedish agriculture has also undergone a regional specialization with a clear market adaptation to the comparative cultivation advantages of the different agricultural regions. The consequences of the specialization have been that milk and beef production have been concentrated to the wood- and parklands of Götaland while pork and crop production have been concentrated to the Götaland flatlands. The following rough price developments form the background of the structural change and the regional specialization:

- Bread grain prices have increased by 100 percent and food grain prices by 110
- Pork prices have gone up 100 percent and milk as much as 300
- Fertilizers, calcium and petrol have become 115 and 215 percent more expensive, respectively.

The slow price development for grains and pork, then, moved the crop production to the highly productive flatlands with their large and united cultivated areas, were it was also combined with a land-intensive pork production. The rather labor-intensive

milk production, on the other hand, has been forced to regions with small and scattered cultivation areas. The price paths of the Swedish agricultural products must further be related to the changes in agricultural policy during the entire post-war period.

The Swedish post-war agricultural policy can be briefly summarized as follows.

1947: The conclusion drawn after the war-time seclusion and several years of bad harvests was that national self-sufficiency should be granted by a somewhat over-sized agricultural sector. The 1947 agro-political resolution contained three goals which have dominated the post-war agricultural politics. These were:

- The goal of income parity
- The self-sufficiency and production goal
- The efficiency goal.

Among the three the emphasis was put on the goal of income which meant "that the part of the population working with agriculture should have the same possibilities as those employed within other sectors to reach a reasonable standard of income and partake of the general welfare increase".

Three kinds of measures were developed for the achievement of these goals: (i) price regulations; (ii) a governmental policy of rationalization for the creation of economically sound agricultural units; and (iii) a special support for small farms in the form of a producers' subsidy on milk production.

The agricultural policy decided upon during the latter half of the forties remained more or less unchanged for about 20 years. The prices on the world market fell, however, and as a consequence the Swedish import tariffs were raised. Hence the national economic costs for the "generously cut" agricultural production rose too.

1967: The 1960 governmental investigation on agriculture therefore suggested that the self-sufficiency degree ought to be reduced from 95 to 80 percent towards the end of the 1970s. The parliament made the decision that the self-sufficiency degree as measured by calories would be 80 percent. The policy instruments would continue to be price regulations and measures of rationalization. The new production goal caused some price pressure and the 100 percent self-sufficiency goal for milk was threatened. As a consequence, the milk price was considerably raised around 1970.

The first part of the 1970s: In the course of the next government investigation the situation on the world market changed. Grain prices increased materially between 1972 and 1974. The prices on the world market even bypassed the Swedish settling prices and export fees were introduced. The Swedish import tariffs were more or less abolished.

1977: The 1972 government investigation introduced the concept of carrying capacity, which was considered to depend on factors like the supply of imported means of production. The meat production should not, investigators argued, exceed the domestic demand. A limited grain surplus, however, ought to be accepted. Further, the area under cultivation in the middle of the 1980s was estimated at 2.9 million hectares. The total area under cultivation in 1979 was 2.96 million hectares, of which 17 percent or 495,000 hectares were situated in Skane. The parliament went along with the investigators and the governmental proposition, which had set the production goal as follows: "Land suitable for cultivation should be used for agricultural production, which implies the maintenance of approximately the present area under cultivation".

2.2. Skane in the Swedish Agricultural Areas

Skane is contained in the three natural agricultural regions:

- the southern flatlands of Götaland
- the parklands of Götaland
- the woodlands of Götaland.

Figure 5 shows the extension of these agricultural regions in a national perspective.

The development from the beginning of the fifties to the late seventies has increased the Skane share of the national area under cultivation from 15 to 17 percent. This development results from the fact that the reduction of the area under cultivation has been considerably slower in the production areas containing Skane than in other production areas (Table 5).

The development within Skane has, for the woodlands of Kristianstad county, led to the quickest reduction of the area under cultivation since the early 1950s, 28 percent. The cultivated area on the flatlands of Malmöhus county was reduced by 4 percent only during the same period, see Table 6.

The division of Skane into natural agricultural regions is shown in Figure 6. A map of Skane with the zonal subdivision used in the sequel is included in the Appendix. With regard to the long-term development in Skane, one might observe that the cultivated area independent of livestock has increase considerably faster than in other parts of the country since the beginning of the fities. On the flatlands of Malmöhus county its share in the middle of the 1970s was 94 percent, while in the Götaland woodlands, it was 52 percent.

Table 7 shows the long-term change in the agricultural meat production in Skane. All kinds of meat production within Skane have since the early fifties been moved from the flatlands to the parklands and the woodlands and hence from the southwest to the northeast. Table 8 throws light on this development process by indicating the over- or underrepresentation of meat production in the different regions (over- and underrepresentation is measured as the ratio between the national meat production share and the national cultivated land share of the region).

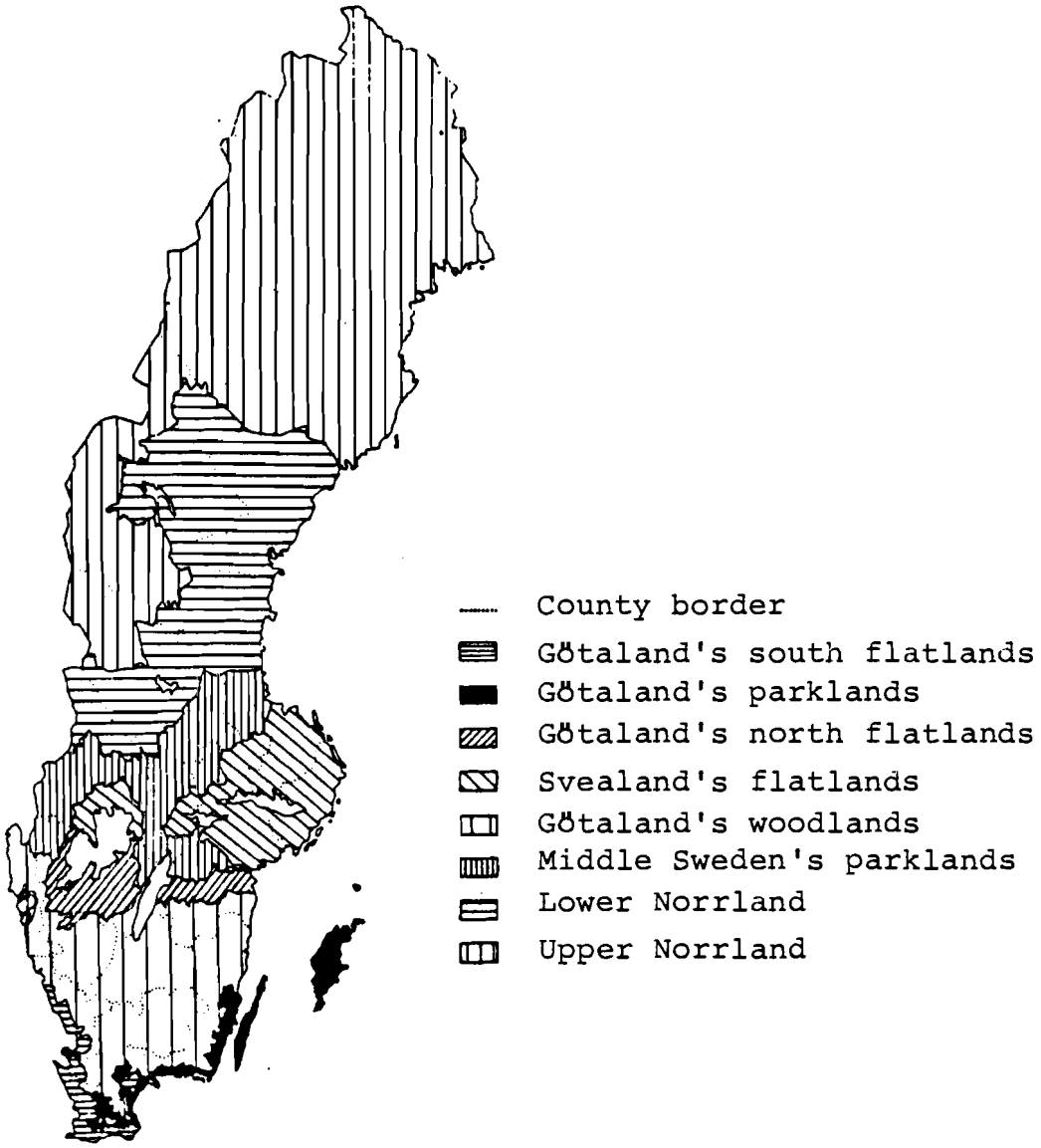


Figure 5. Sweden divided into natural agricultural regions 1979.

Table 5. The long-term development of the area under cultivation in different production regions.

Production region	1951	1961	1971	1976	1979
Southern Flatlands of Götaland	100	96	93	92	92
Parklands of Götaland	100	94	91	91	90
Woodlands of Götaland	100	88	77	76	75
Sweden	100	90	83	82	81

SOURCE: The Agricultural Enterprise Register, National Bureau of Statistics.

Table 6. The long-term development of the cultivated area in different parts of Skane (1951 index = 100).

Region	Distribution of cultivated land, 1951	1951	1961	1971	1976
Kristianstad county:		100	92	83	82
Woodlands	11%	100	85	73	72
Parklands	14%	100	93	90	90
Flatlands	15%	100	95	84[a]	83
Malmöhus county:		100	95	95[a]	94
Woodlands	5%	100	93	89	88
Parklands	15%	100	95	92	91
Flatlands	40%	100	96	97[a]	96
Total	100%				

[a]Changed regional division.

SOURCE: B. Lennartsson. Regional fördelning av lantbrukets produktionsvolym, tabellbilaga, Uppsala 1980.

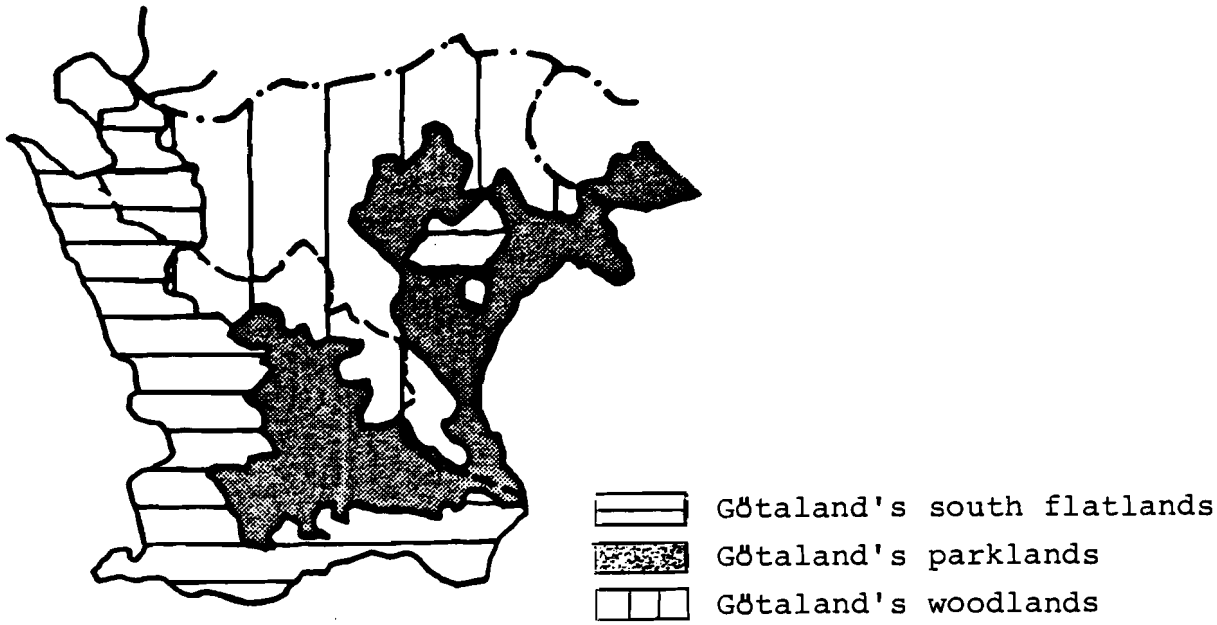


Figure 6. The total agricultural land in different production regions, 1978.

Table 7. Long-term development of the share of cultivated land independent of livestock (percent).

Region	1951	1961	1971	1976
Kristianstad county:	60	64	69	71
Woodlands	50	48	43	43
Parklands	63	66	72	75
Flatlands	67	74	83	85
Malmöhus county:	69	75	85	87
Woodlands	50	53	56	57
Parklands	59	63	73	76
Flatlands	75	82	92	94
The Nation	53	59	66	69

SOURCE: B. Lennartsson. Regional fördelning av jordbrukets produktionsvolym, tabellbilaga, Uppsala 1980.

Table 8. Over- and underrepresentation in different regions: meat production in Skane, 1951 and 1976.

	Livestock		Milk		Pork	
Region	1951	1976	1951	1976	1951	1976
Kristianstad county:						
Woodlands	111	210	105	194	186	187
Parklands	99	141	81	120	250	388
Flatlands	96	86	77	75	411	453
Malmöhus county:						
Woodlands	125	181	110	169	267	167
Parklands	106	125	87	113	282	171
Flatlands	80	40	61	33	204	207

SOURCE: B. Lennartsson. Regional fördelning av jordbrukets produktionsvolym, sammanställning fran tabellbilaga, Uppsala 1980.

2.3. The Specialization of the Agricultural Areas

In spite of continuous specialization and structural change the regional productivity varies much in Swedish agriculture. By and large the productivity curve keeps decreasing as you move from the south Götaland flatlands to the north of the country. Ricardo's thought model might illustrate how the agricultural productivity decreases as the production is extended to less productive regions.

To start with we shall illustrate the total profit from agriculture's total land use, the latter roughly categorized as follows:

- Cultivated land
- Pastures
- Other grasslands
- Woodlands
- Other land

In a corresponding way we shall summarize the total production value in producer prices. This consists of, in the first place, the total income from sales, i.e., the income from the following groups of products:

- Crop products
- Meat products
- Wood products
- Miscellaneous (land rents, transports, etc.)

Figure 7 shows--in the form of a diagram--the 1978 spread in total agricultural income per hectare land between the agricultural regions, these being ordered from the south to the north according to the notation given in the figure.

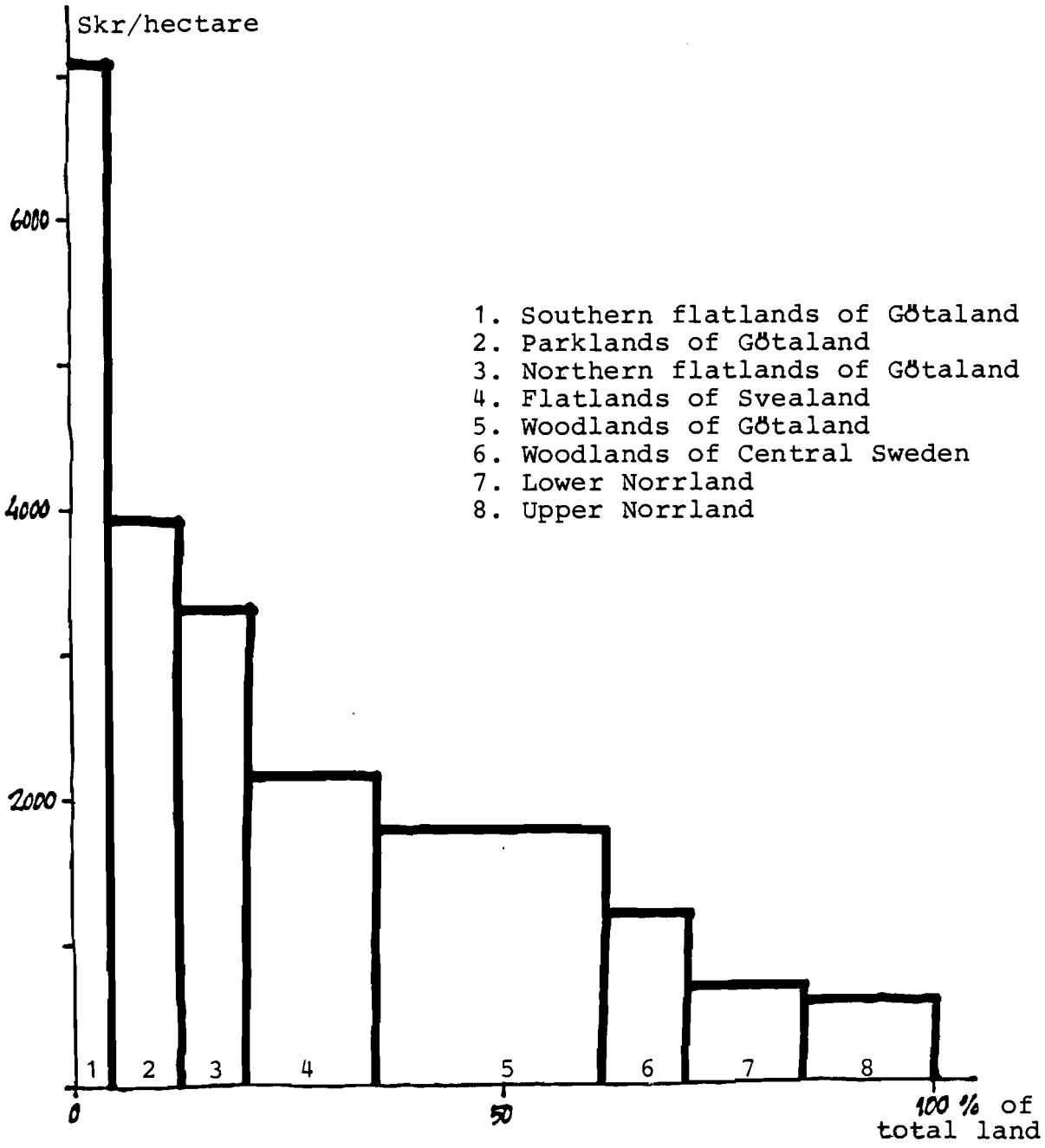


Figure 7. Total agricultural production per hectare in different production areas, 1978.

1. Southern flatlands of Götaland
2. Parklands of Götaland
3. Northern flatlands of Götaland
4. Flatlands of Svealand
5. Woodlands of Götaland
6. Woodlands of central Sweden
7. Lower Norrland
8. Upper Norrland.

Horizontally in the diagram each region is represented by its national share of the total agricultural land use. A curve of this kind can be considered a marginal product curve of all land at the disposal of Swedish agriculture. In other words the curve shows the agricultural productivity decrease as the production is extended to regions with ever lower yielding capacity and an accordingly structured production.

The interpretation of Figure 7 as a kind of demand curve for agricultural land is complicated by the fact that this interpretation presupposes the variable production cost per hectare land to be identical in all parts of the country. In reality the adaptation of both product structure and production technique to comparative cultivation advantages makes the curve of the variable costs per hectare land fall, too.

The variable production cost in agriculture consists of the following main components:

- Grains and feed
- Fertilizers, calcium, etc.
- Energy costs
- Wages including social costs
- Maintenance
- Various costs.

Per hectare of land the total variable cost is about ten times higher on the southern flatlands of Götaland than in Norrland. In Figure 8 the variable cost per hectare of land in the different production regions has been added to Figure 7.

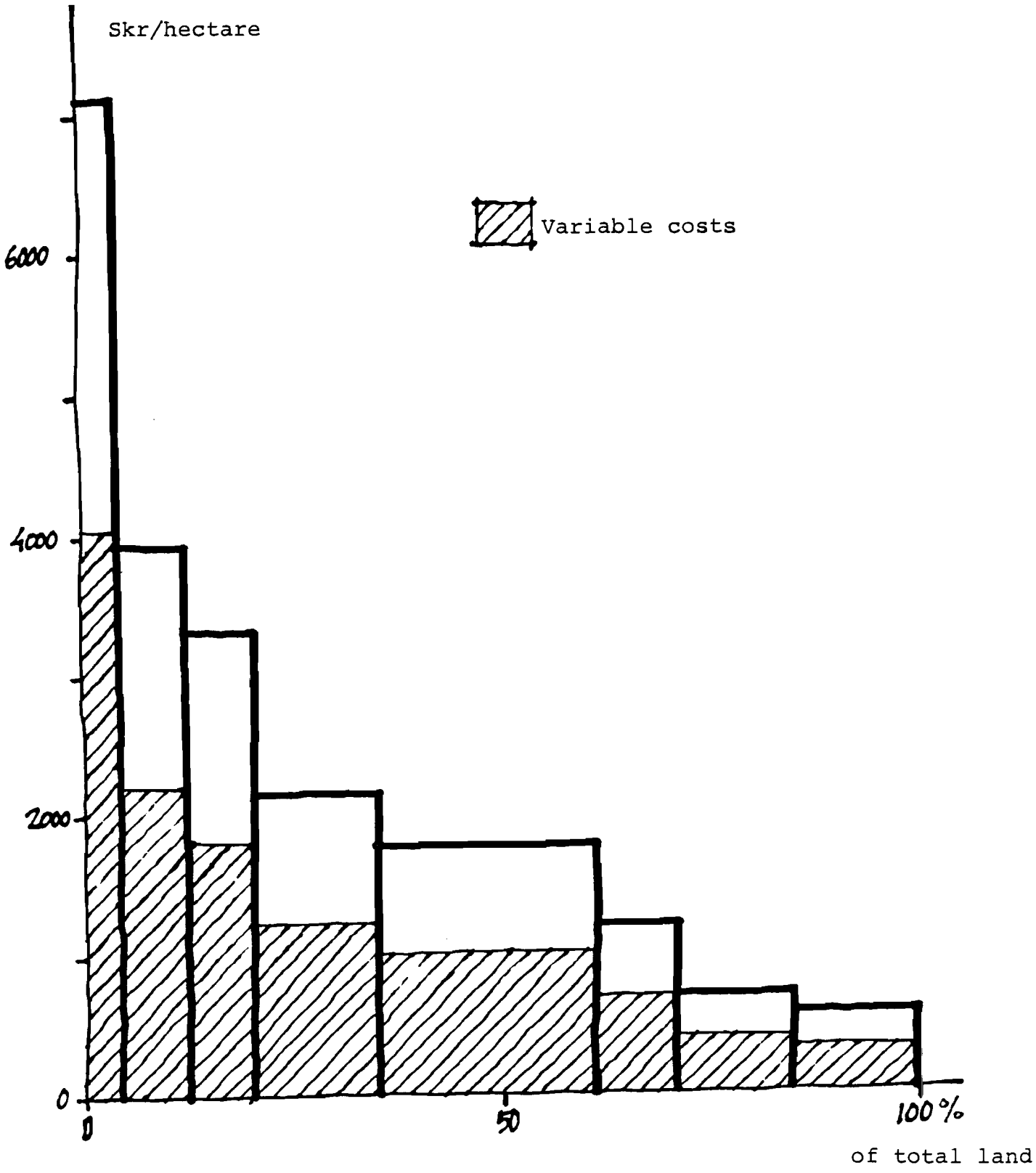


Figure 8. Agricultural production and variable costs per hectare of total land use 1978.

So far the costs and incomes of agriculture have been related to its total land. The total land area, however, includes some unproductive land--so-called other land. In Skane its share is 4 percent only while in other parts of the country it can be even 30 percent. If you exclude the unproductive land and define cultivated land, pastures, other grasslands and woodlands as productive land, the cost and income structure of the different production regions becomes more evenly spread (see Figure 9).

Most of the cultivated land may, as already mentioned, be independent of meat production. Hence its productivity becomes a function of its crop production capacity. Figure 10 indicates the 1978 crop production volume per hectare of cultivated land. As in the previous diagrams the width of the staples demonstrates the national cultivated land-share of the different production regions. The diagram can therefore be seen as a "demand curve for cultivated land used for crop production". It is at this point possible to assert that the spread in the yield of productive land between different parts of the country is mainly due to the spread in the yeild of crop production. If, however, crop and meat production are considered to be complementary, their production results must be related to the total productive land, woodlands excluded. In such a case a demand curve for production cultivation and grazing land used for crop and meat production may be defined (Figure 11).

In conclusion we may state that the Swedish agriculture has undergone a considerable regional specialization since the early 1950s. The main part of this specialization can be explained in terms of comparative advantages for crop production. The development has also led to a long-term reduction of cultivated land. The reduction pattern was set by the regional differences in comparative advantages for crop production. Hence, the cultivated area was reduced three times faster in the woodlands of Götaland than on the southern flatlands of Götaland (Table 9)

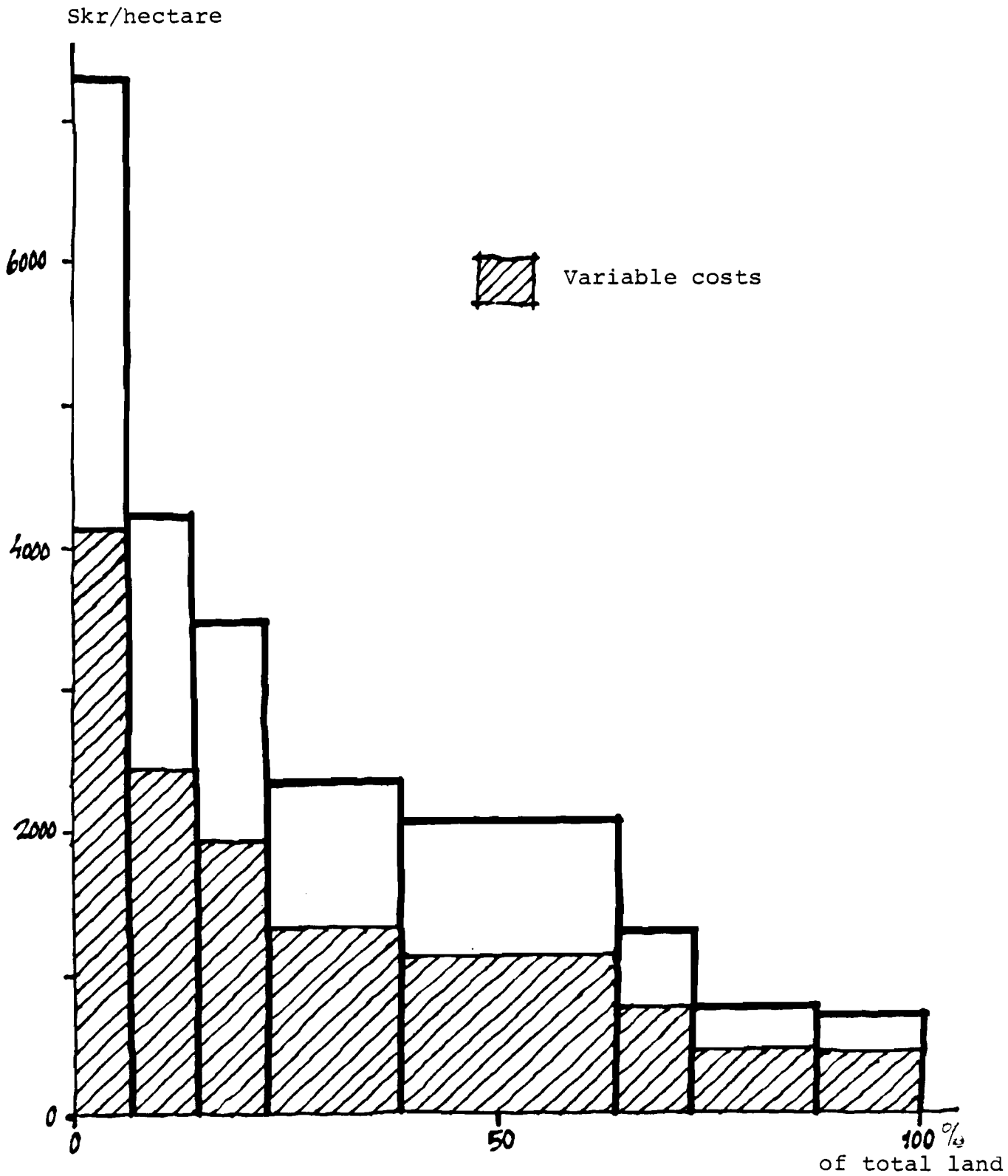


Figure 9. Agricultural production and variable costs per hectare productive land 1978.

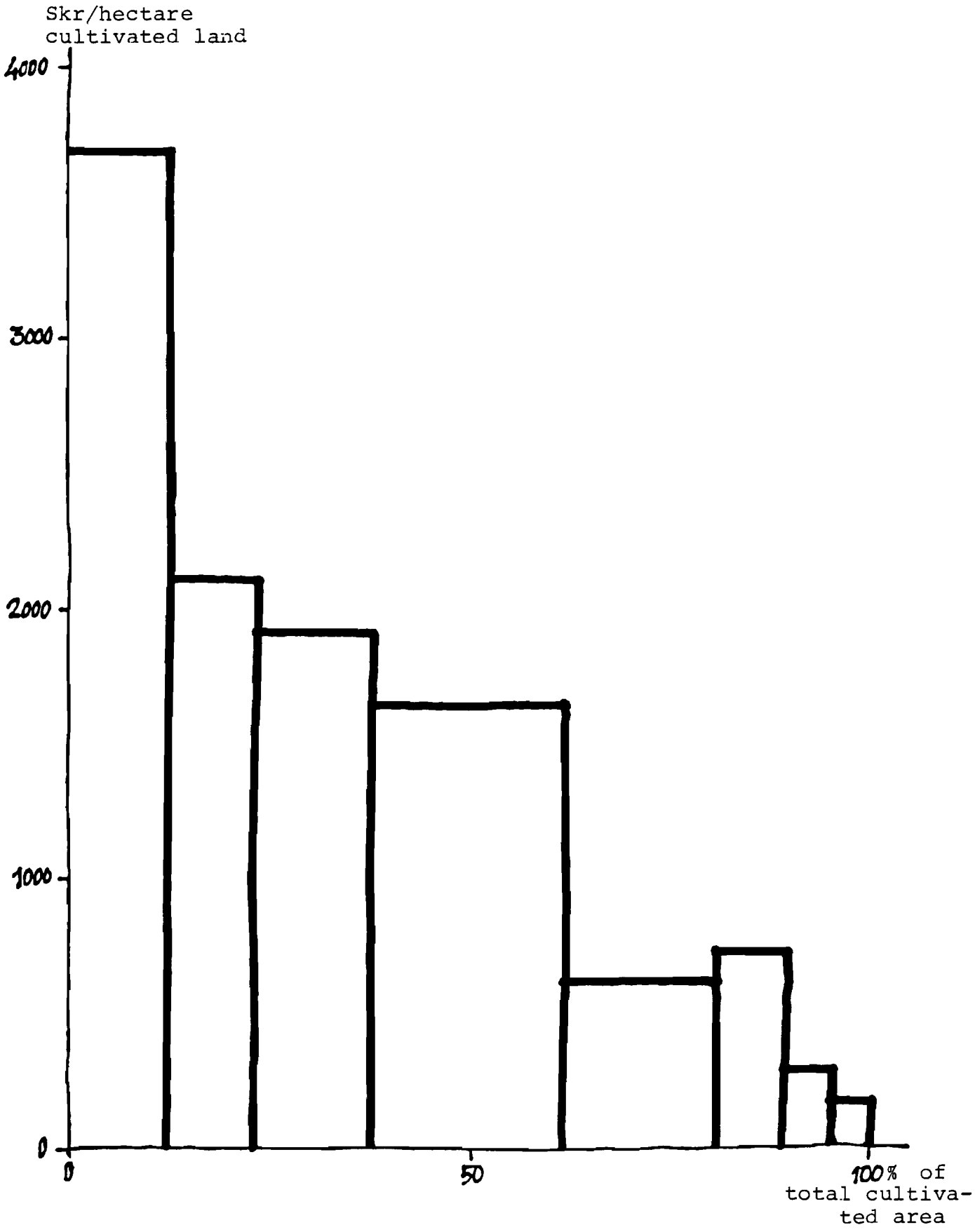


Figure 10. National"demand curve" for cultivated land used for crop production in 1978.

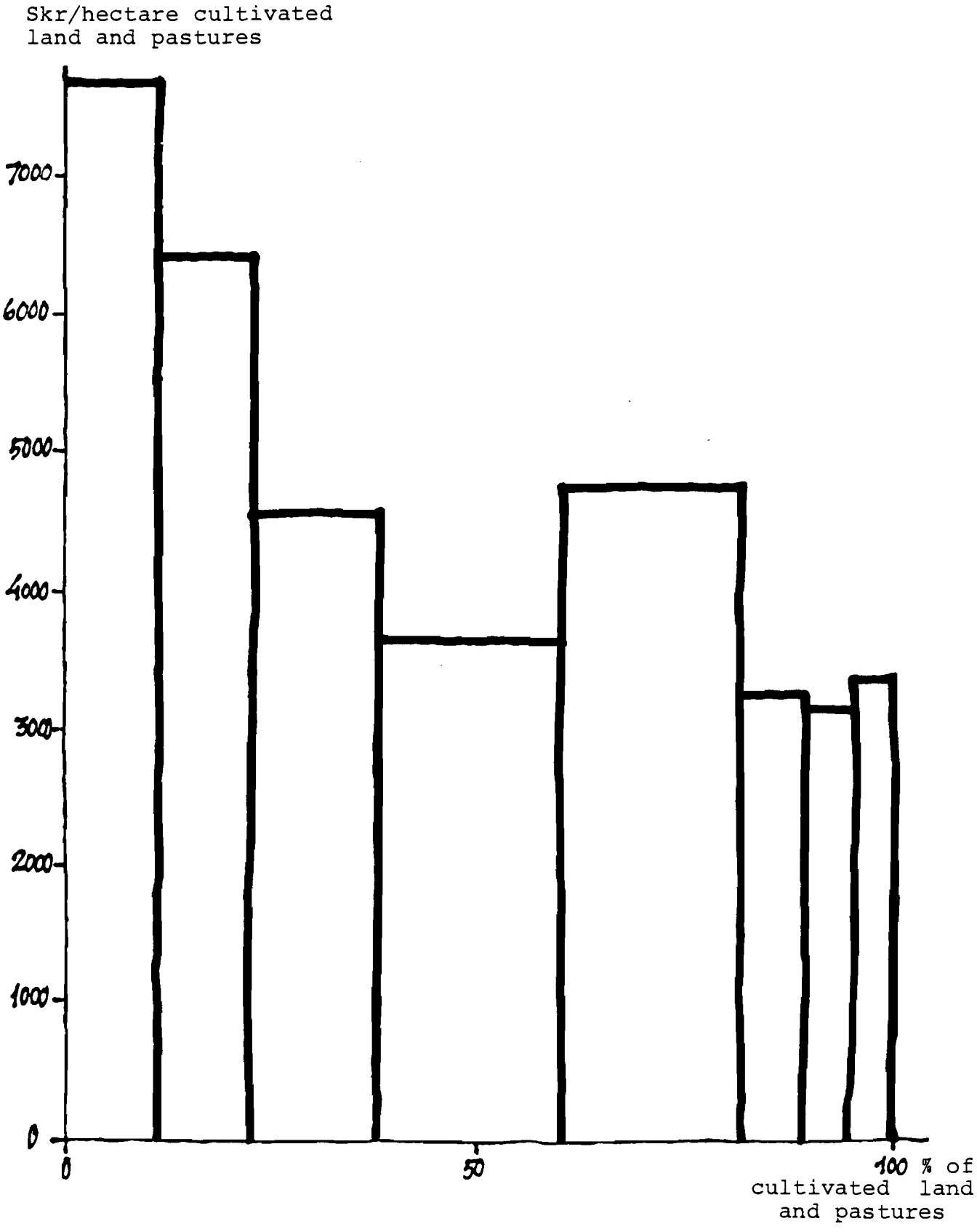


Figure 11. Crop and meat production per hectare of cultivated land and pastures 1978.

Table 9. Annual reduction of cultivated land between 1950 and 1979.

Region	Percent/Year
Nation	0.7
Woodlands of Götaland	1.0
Woodlands of Kristianstad county	1.1
Southern flatlands of Götaland	0.3
Flatlands of Malmöhus county	0.1
Skane	0.3

2.4 Farm Structure and Employment

The Skane agriculture included towards the end of the 1970s more than 16,000 farms having at least 2 hectares of cultivated land. These farms had, totally, 65 percent of the total Skane area at their disposal. Table 10 summarizes the distribution of the agricultural land betwen different land use categories.

The average area per agricultural production unit in Skane was at the end of the 1970s, 45 hectares. The national average at the same time was 74 hectares, the difference being explained by the four times bigger forest area per production unit in the rest of the country. In Skane the mean forest area per agricultural production unit is 9 hectares.

Table 10. Distribution of farming land in Skane and the nation in 1979.

Land Use Category	Skane	Sweden
Cultivated land	68%	33%
Pastures and other grasslands	8%	4%
Woodlands	20%	51%
Other land	4%	12%
Total	100%	100%

SOURCE: SM J 1980:5.2.

You further observe that the total area is much more unevenly distributed between the farms in Skane than in the rest of the country. This is shown by the so-called Lorens diagram below (Figure 12).

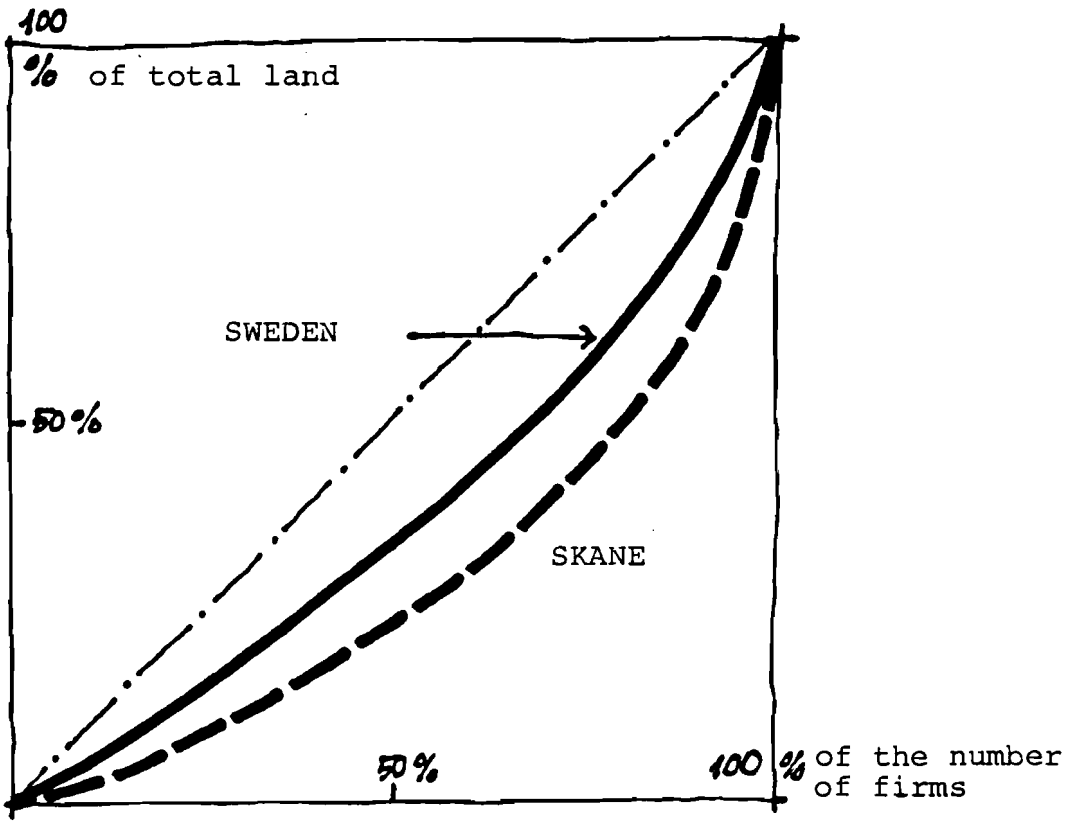


Figure 12. The acreage distribution of total land for farms in Skane and in Sweden 1979.

The development in Skane during the later part of the 1970s has reduced the number of farms having at least 2 hectares of cultivated land by 1200 or 7 percent. During the same period the area under cultivation was reduced by 1 percent. Because of the farm fusions in the late seventies the average area of cultivated land per farm in Skane increased from 29 to 31 hectares. A corresponding development in the country as a whole has led to an increase of the cultivated area per farm from 23 to 25 hectares. Table 11 shows the farm structure of Skane and of the nation.

The farms in Skane have a somewhat more even size distribution of cultivated land than the nation as a whole, which is shown in Figure 13.

Table 11. Firm structure of agriculture in 1979.

	Skane	Sweden	Skane's share
Number of units with more than 2 hectares of cultivated land	16,059	120,631	13%
Number of units with more than 30 hectares of cultivated land	4,888	28,912	17%
Number of units without forest land	10,559	33,771	31%
Number of units privately owned	14,309	101,254	14%
Number of company-owned units	124	415	30%
Number of share-cropper units	3,055	18,278	17%

SOURCE: SM J 1980:5.1 or 5:2.

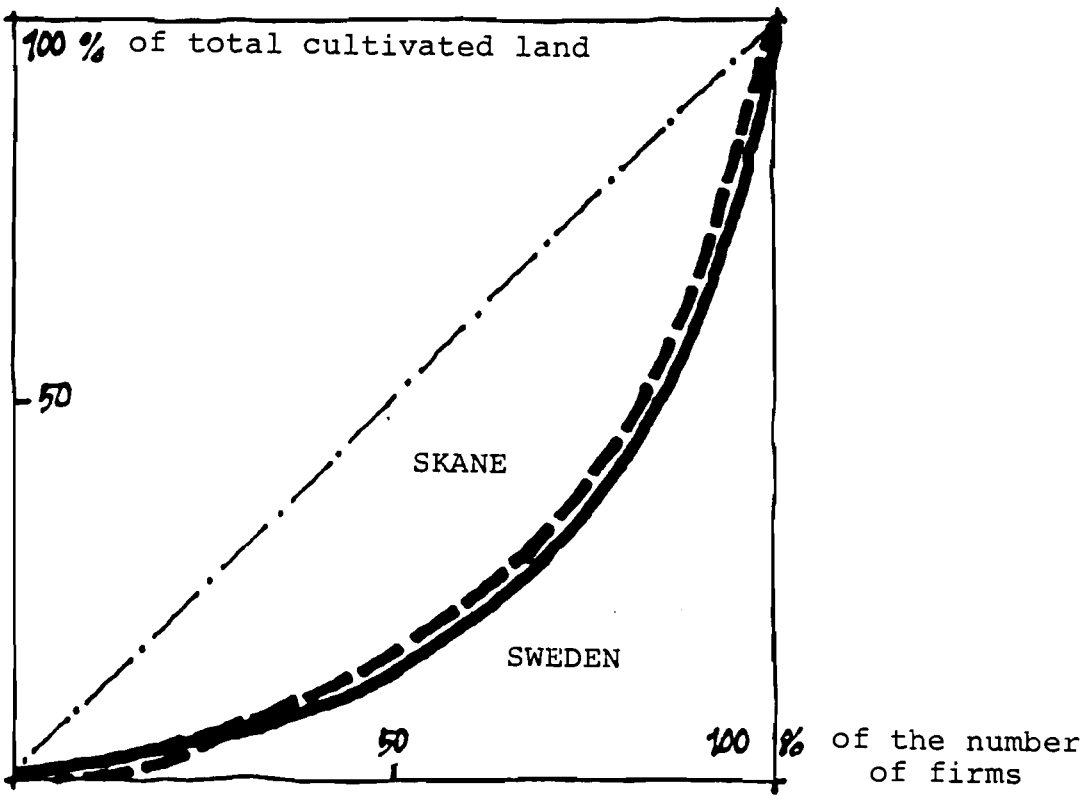


Figure 13. The acreage distribution of cultivated land for in Skane and in Sweden 1979.

At the same time it tuens out that the cultivated area in both Skane and the rest of the country is much more unevenly distributed than the total area.

The agricultural employment structure can be described in different ways depending on the concepts and definitions used by the various sources. According to the so-called labor market surveys the agricultural employment in Skane decreased by 6 percent during the late 1970s. In the nation as a whole the agricultural employment during the first half of the 1970s decreased by 17 percent and during the second half by 7 percent, see Table 12.

The most detailed description of the agricultural employment during the later part of the 1970s can be found in the Agricultural Register which states that more than one fourth of the agricultural labor force in Skane consisted of ordinary employees (Table 13)

Table 12. Agricultural employment in Skane and the nation according to the Labor Market Surveys.

Year	Skane	Sweden	Skane's share
1970	44,000	313,500	14%
1975	41,500	261,000	16%
1979	34,400	242,000	14%

Table 13. The agricultural employment structure in Skane and the nation 1975 and 1979.

	Skane	Sweden	
	1979	1975	1979
Farmer or family members			
- permanent	25,000	206,500	189,600
- temporary	2,800	28,000	23,800
Hired labor			
- permanent	5,300	32,500	27,600
- temporary	4,600	26,400	18,800
Total	37,700	293,400	259,800

SOURCE: National Bureau of Statistics Agricultural Register.

Figure 14 illustrates the relation between the size of the farm and the employment per hectare of cultivated land in Skane in 1979. The employment intensity is shown to increase rapidly for farms with less than 50 hectares. The step function of the diagram can also be seen as a marginal cost curve describing the increase in real-term labor cost in the Skane agriculture as the cultivated area encompasses successively smaller farms.

It must further be pointed out, that the increase in employment intensity by a decrease in farm size can be related to a product structure, which demands more manpower, and to the lower capital intensity of these farms.

The farm and employment structure of the Skane agriculture can be summarized as follows:

- During the 1970s the Skane agricultural employment has decreased by an average of 1.5 percent per year.
- At the end of the decade one third of the employment concerned meat production and two thirds crop production.
- Since the beginning of the 1950s the average cultivated area per farm has increased steadily by 2.5 percent per year.
- Judging from the post-war trends of total development of cultivation acreage in Skane, and farm fusions, the number of farms at the end of the 1990s will be 10,000. The average area under cultivation per farm will by then be 50 hectares.
- The farm fusion process will cause the Skane agricultural employment to be reduced by half during the remaining part of the century.

2.5. Crop Production in Skane

The comparative advantages for the Skane crop production have since the beginning of the fifties caused the Skane share of the national cultivated land to increase by 2 percent. In

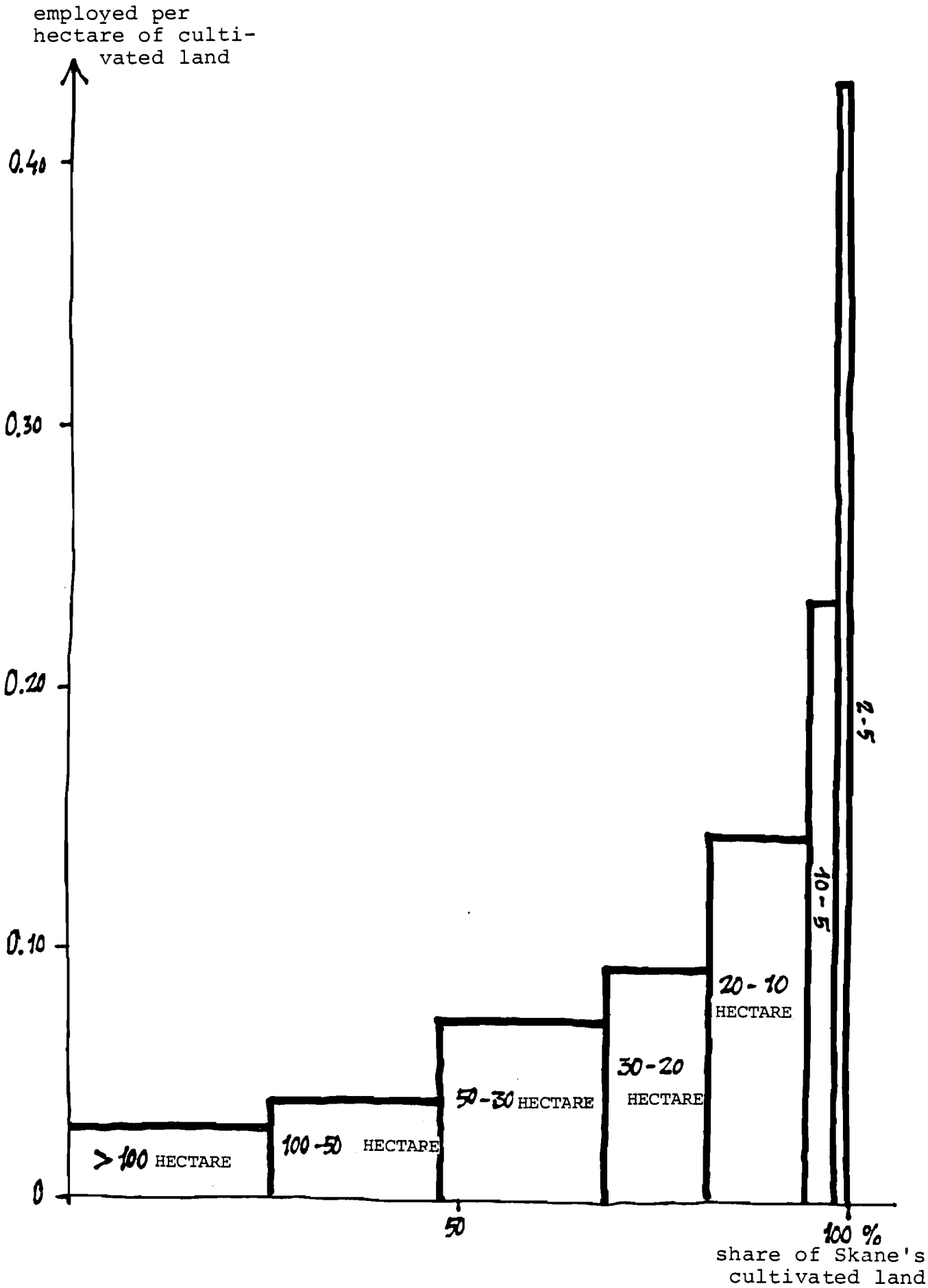


Figure 14. The agricultural employment intensity at ever smaller production units in Skane 1979.

a more dramatic way the development is illustrated by the fact that the share of livestock-independent cultivated land has increased from 65 percent in the early fifties to 85 percent in the late seventies. This directly reflects the domestic development of relative prices for crop and meat products and the comparative advantages for crop production in Skane, see Figure 15.

2.5.1. Production Patterns

During the late 1970s 44 percent of the total Skane area was used for crop production. For farms with more than 2 hectares the total cultivated area in 1975 was 497,900 hectares, compared to 494,400 hectares in 1979.

Figure 15. Domestic price relation between crop and meat products 1951-1980.

Given the regional division shown in Figure 16 the cultivated land in the middle of the seventies made up more than 80 percent of the total area in the following 8 regions: Kävlinge, Hjärup, Staffanstorp, Oxie, Vellinge, Anderslöv, Smygehamn and Trelleborg. In two regions cultivation occupied less than 20 percent of the total area: Klippan and Hässleholm.

Approximately 55 percent of the cultivated land in Skane were, in the late seventies, used for grain cultivation, around ten percent for oil-plants and sugarbeets. Table 14 summarizes the use of the cultivated land in Skane during the later part of the 1970s.

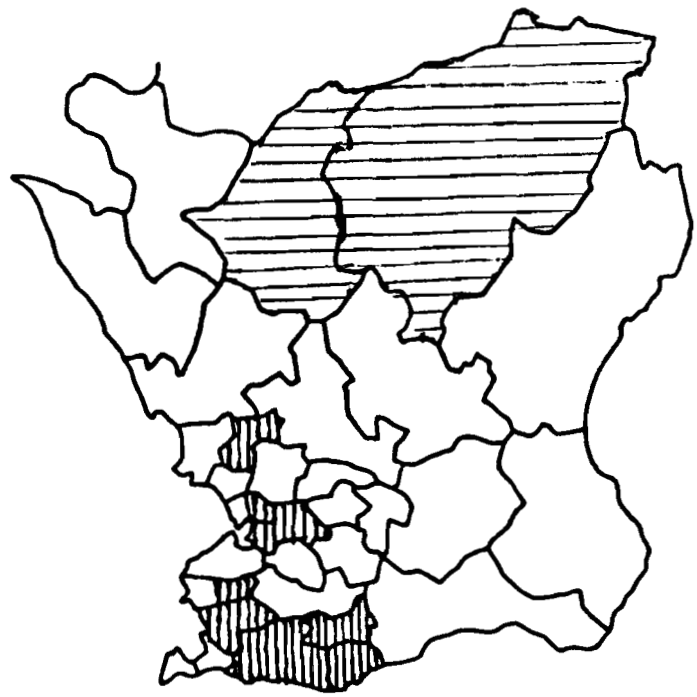


Figure 16. Regions with a small (horizontal stripes) and large (vertical stripes) share of cultivated land.

The foremost observation from the late seventies is the occurrence of a shift from bread to fodder grains in Skane. 80 percent of the national cultivated land used for sugarbeets are concentrated to Skane, which also lodges one third of the nation's potatoe cultivation area. Table 15 gives the Skane share of the national cultivation area for different crops in the second half of the 1970s.

Table 14. The use of cultivated land in Skane during the late 1970s.

	Acreage (hectares)		Percentage distribution	
Crop	1975	1979	1975	1979
Fodder grain	166,200	187,400	33	38
Bread grain	99,500	89,200	20	18
Forage	96,000	94,200	19	19
Oil-plants	43,900	37,400	10	7
Sugarbeets	43,100	42,700	9	9
Other plants	18,900	14,800	4	3
Potatoes	14,300	14,000	3	3
Green fodder	4,100	3,500	1	1
Legumes	1,100	5,700	0	1
Areas not used and fallow	5,400	5,500	1	1
Total	497,900	494,400	100	100

SOURCE: SCB SMJ 1976:5.2 or 1980:5.2.

Table 15. Skane's share of the national acreage in different crops during the late 1970s.

Crop	1975	1979
Sugarbeets	82%	82%
Potatoes	33%	34%
Oil plants	29%	23%
Bread grain	25%	29%
Fodder grain	14%	15%

A comparison of Tables 15 and 16 reveals that the shift from bread to fodder grains has been considerably slower in Skane than in the rest of the country. For the most important crops the Skane soil yields 10 to 35 percent more than the average Swedish soil. The Skane productivity advantage is particularly large for fodder grain, sugarbeets and forage.

Table 16. Average harvests in Skane in relation to the national mean; yield advantages (in percent).

Crop County	1971	1972	1973	1974	1975	1976	1977	1978
Bread grain								
Kristianstad	14	14	14	13	10	11	13	11
Malmöhus	20	19	18	16	14	15	17	15
Fodder grain								
Kristianstad	15	16	16	17	16	15	13	11
Malmöhus	34	34	33	33	33	33	30	29
Forage								
Kristianstad	22	23	26	27	28	28	27	27
Malmöhus	33	32	33	33	33	33	34	34
Potatoes								
Kristianstad	11	10	10	10	12	10	9	10
Malmöhus	17	15	14	15	16	16	17	17

SOURCE: SCB harvest damage protection statistics.

A weighting of the Skane productivity advantages for different crops by the land shares of these crops shows that the agricultural land in Skane towards the end of the seventies yielded more than the national average. This is shown in Table 17.

Table 17. Total crop harvests in Skane during the second half of the 1970s.

Crop	1975 1000 tons	1978 1000 tons	National Share 1975
Fodder grain	571	722	17%
Bread grain	477	479	30%
Forage	306	417	
Potatoes			
Household use	158	266	41%
Industry use	181	283	
Sugarbeets	1,680	1,888	84%
Oil plants	127	131	40%
Total	3,500	4,186	

Taking into consideration the crop product price structure further underlines the productivity advantages of Skane, expressed as production value per hectare.

Table 18 sums up the value of the crop production in Skane in 1975 and 1978. According to this listing the production value (in nominal prices) amounted to almost 1.4 billion Swedish Crowns in 1975 and more than 2 billion in 1978. Thus, it was equivalent to 35 percent of the national production value during the period.

Table 18. The value of crop production in Skane 1975 and 1978.

Crop	1975 1000 tons	1975 price Skr/ 100 kg	1975 Value million Skr	1978 1000 tons	1978 price Skr/ 100 kg	1978 Value million Skr
Fodder grain	571	58.9	336	722	71.7	518
Bread grin	477	64.6	308	479	75.6	362
Forage	306	54.4	166	417	60.0	250
Potatoes						
Household use	158	83.7	132	266	96.0	257
Industry use	181	23.8	43	283	37.9	107
Sugarbeets	1,680	14.2	239	1,888	16.4	310
Oil plants	127	121.0	154	131	162.0	212
Total	3,500	39.2	1,378	4,186	48.2	2,016

Table 18 enables us to calculate an average value for the Skane crop production. In 1975 this was 2,800 Skr per hectare. Correcting for the price development between 1975 and 1978, we find the corresponding 1978 value to be 3,400 Skr.

It must be underlined that the production value per hectare varies considerably between the different crops. This fact allows us to explain partly the increase in mean productivity for the Skane crop production as a whole. In Figure 17 the yield per hectare of different crops has been ranked vertically. In the horizontal direction the cultivated land share of each crop has been indicated.

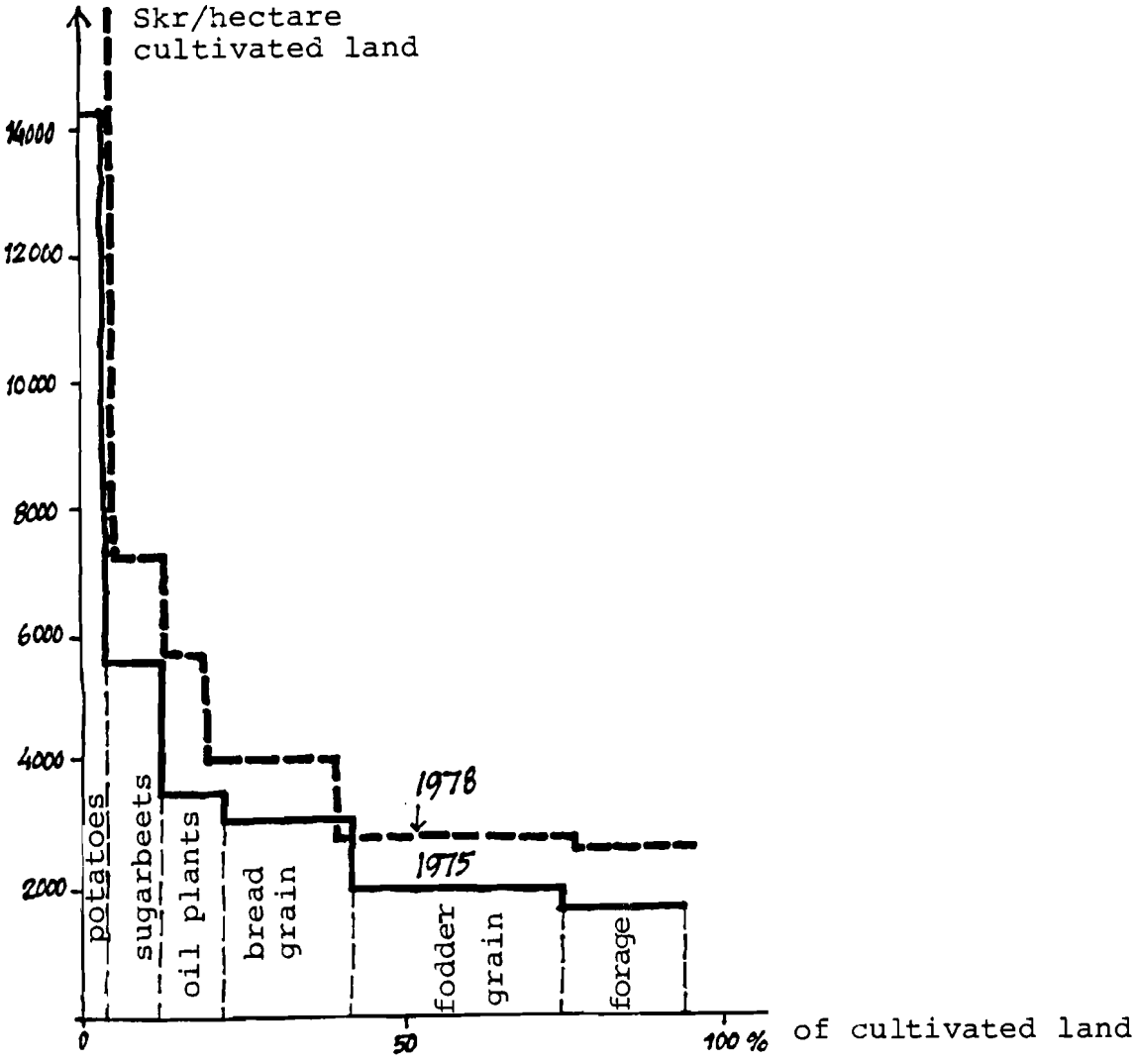


Figure 17. The yield pattern of crop production in Skane 1975 and 1978.

2.5.2. Integration and Land Use

Most of the Skane crop production goes in a first step to other production sectors within Skane. Of the total, around 50 percent are reserved for the intra-regional food industry in the form of intermediary shipments to the milling, sugar, fodder, oil and beverage industry, etc.Thus, the crop sector forms a dominating base for major parts of the Skane food industry. The rest of the crop production goes to wholesale or leaves Skane directly.

In its need for input resources the crop production is strongly linked to the chemical industry. Various fertilizers are demanded. The chemical sector provides 30 percent of the intra-regionally purchased intermediary shipments to the crop production sector. The rest of the shipments to the crop sector consists mainly of motor fuel machinery, industrial products and a variety of necessities from the wholesale business.

There are no directly available public statistics specifying the employment within the Skane crop sector. Therefore it must be calculated on the basis of labor productivity studies made for different parts of the agricultural sector. On these grounds the estimated crop production employment amounts to slightly more than 20,000 persons in Skane, which corresponds to one worker per 25 hectares on the average for the region as a whole. In addition, an average of one person per 70 hectares is temporarily hired for the harvest season. The total employment within the crop production in Skane, then, adds up to slightly more than 25,000 during the harvest season.

The location pattern of the crop production during the end of the 1970s is shown in Figure 18 in the case of the land use for forage and fodder grains. In the north-eastern parts of Skane forage accounts for more than 50 percent of the cultivated land total while the same crop covers less than ten percent of the cultivated land in the west and south-west. The north-east therefore has a low land-use figure for fodder grains. The most important substitution, area-wise, is thus found to be between fodder grains and temporary pastures, which also--in comparison to other crops--differ little in yielding capacity. In this way we note a significant levelling-out of productivity within the crop production sector in Skane.

Southwest Skane contained in the latter half of the 1970s slightly more than one fifth of the region's total area under cultivation, or 106,000 hectares. During the same period the crop production employment of this region amounted to almost 4,300 persons, which is the equivalent of almost half of the labor force within the chemical industry of southwest Skane.

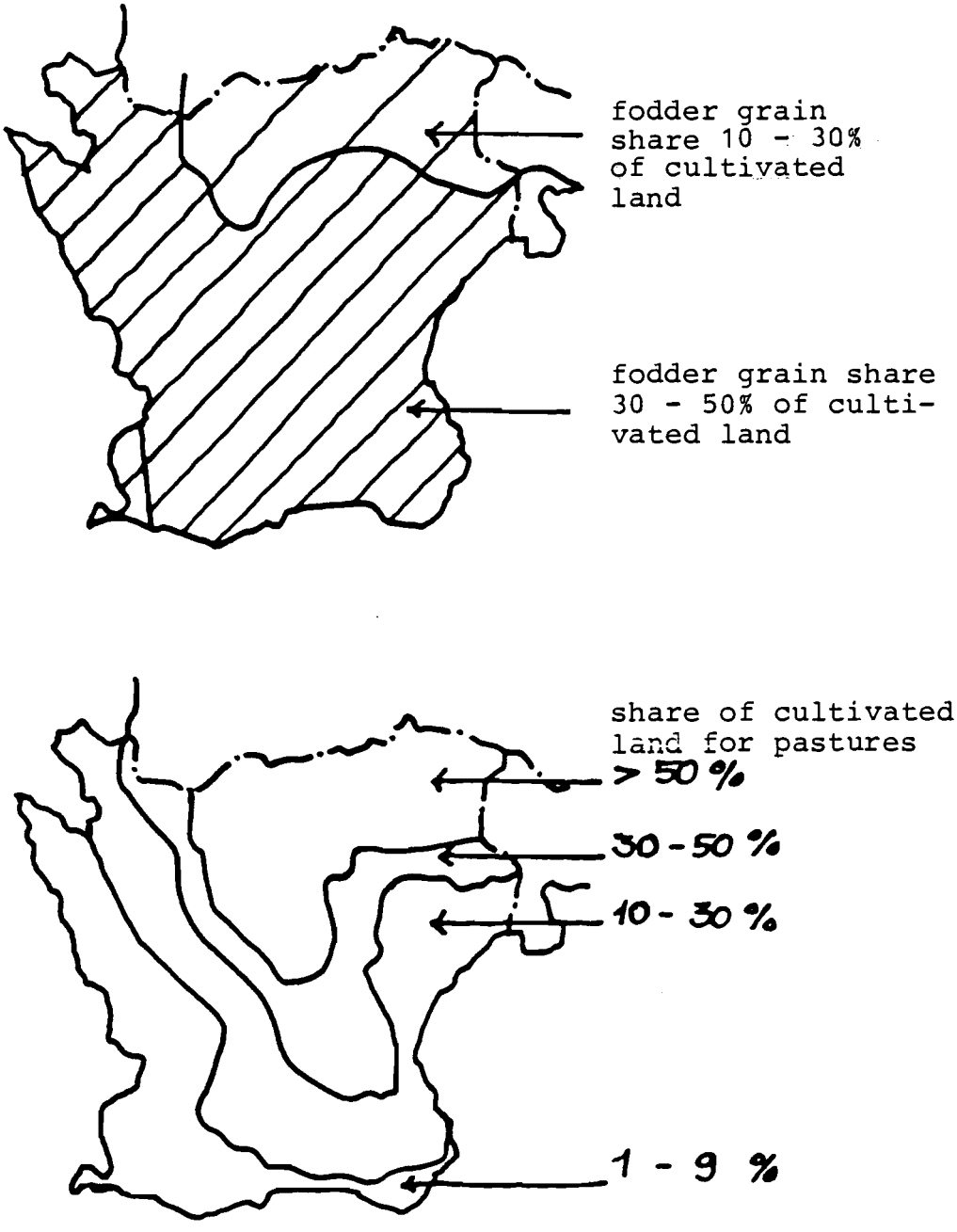


Figure 18. Land-use for forage and fodder grains in Skane in 1978.

2.5.3. Summary of Basic Facts

- Slightly more than one third of the total national crop production during the late seventies was accounted for by Skane.
- The most important crops yield 10 to 35 percent more in Skane than the national average.
- The long-term growth of the crop production productivity per hectare of cultivated land has been in the average 1.5 to 2 percent annually.
- Simultaneously the area under cultivation has been reduced by 0.3 percent per year since the beginning of the fifties. The net growth of the Skane crop production thus adds up to slightly more than one percent annually for the period under consideration.
- An agricultural policy aiming at an unchanging regional distribution of production could accept a two to three times faster reduction of the Skane cultivated land than during the period between 1950 and 1979.

2.6. Meat Production in Skane

2.6.1. Production Patterns

Meat production primarily consists of milk production and livestock production. Until the first half of the 1960s the Skane share of the national meat production increased. Since then its share has decreased for some products and increased slightly for others. Table 19 roughly illustrates these paths of development.

Table 19. Skane's share of the national meat production.

	1932	1951	1961	1976
Cattle farming	14	15	18	17
Pork production	32	25	40	43

SOURCE: SCB.

The decline of cattle breeding in Skane since the fifties can, as noted already, be explained by the comparative advantages of different parts of the country for specialized agricultural products. It might further be assumed that the lowering of the relative prices for pork and the scale advantages of this production branch have enforced an increasing concentration to Skane, which also has the largest fodder grain surplus in the country. Figure 19 indicates the development of the relative prices for milk and pork.

The total value of the Skane meat production during the late seventies derived, in summary, from milk production, slaughter of cattle, calf and swine. For 1975 we have estimated a total production value (in producer prices) of almost 1.7 billion Skr on the basis of weight and volume figures plus average settling prices. Table 20 shows the spread of the total value of the meat production in Skane in the second half of the 1970s.

Table 20. The value of meat production in Skane distributed over products (late 1970s).

Product	Percentage Share
Milk	27
Slaughter:	
Cattle	25
Swine	48
Total	100

SOURCE: SCB.

2.6.2. Integration and Land Use

The production value in the Skane meat sector has in the late seventies exceeded the corresponding crop sector value by 15 to 20 percent. The meat sector employment, however, we estimate to have equalled half of that of the crop sector.

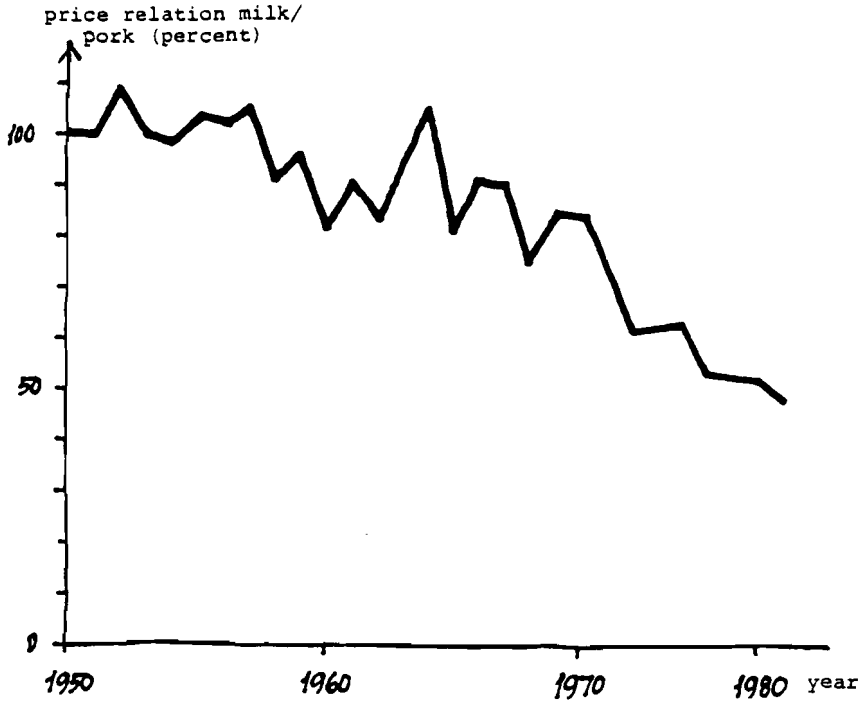


Figure 19. The development of the relative prices of milk and pork.

On the basis of an interregional input/output table we conclude that almost 80 percent of the Skane meat sector production is sold within the region to the Skane food industry. 50 percent of the intraregional shipments to the meat sector come from the food industry, mainly fodder. Hence the Skane meat sector is considerably more integrated with the food industry than the crop sector.

As shown in Figure 20 the meat production in Skane is concentrated to a narrow stretch from Simrishamn in the southeast to Skälderviken in the northwest. In the "corridor" we find about two thirds of the total meat production of Skane. On the outside of this region there is one main concentration around Kristianstad.

The meat production land use is in the first place related to cultivated pasture areas. Skane held 35,500 hectares of cultivated grazing land in the second half of the 1970s, which amounts to 3 percent of its total area. 4,000 of these hectares (11 percent) were located in southwest Skane. Six regions have

particularly large shares of cultivated grazing land--Dalby, Veberöd, Klippan, Hässleholm, Hörby and Kristianstad. In these regions the sown pastures equal more than 10 percent of the area under cultivation (Figure 21).

Relating the Skane meat production to the use of pastures we find that the return from the total meat production adds up to 46,000 Skr per hectare. Swine production excluded, the corresponding value is 24,000 Skr per hectare (in 1975 prices).

a) Units with more than 25 cows

b) Units with more than 250 pigs

Figure 20. Location of meat production in Skane 1979.

Figure 21. Regions with a large share of sown pastures.

2.7. Agricultural Energy Use in Skane

The post-war development in Swedish agriculture has led to a substantially increased energy intensity. Capital and energy have been substituted for manpower as a reflection of the cost development. From 1951 to 1978 the relative price between manpower and motor fuel rose by a bit more than 600 percent, between manpower and capital by almost 250 percent.

Towards the end of the seventies the total use of petroleum products in the agriculture in Skane amounted to 230,000 cubic meters per year. As a comparison the residential oil consumption in Skane in the same period added up to an annual 625,000 cubic meters.

The use of petroleum products is in the first place to be related to the crop production and on this basis the agricultural oil consumption per hectare of cultivated land in Skane would be almost 0.5 cubic meters (460 liters).

3. FOOD INDUSTRY IN SKANE

3.1. Position in the World Market

The food industry is one of the most important industrial sectors in Skane. During the seventies it accounted for 30 percent of the total Swedish food industry production.

Swedish food industry has since the middle of the fifties undergone considerable changes. As an example the number of production units has been halved in the twenty years from 1955 to 1975. The total employment volume of the branch has not, however, changed significantly during the same period. Consequently, there has been a rapid transition to ever larger production units.

In the middle of the fifties the average number of employees per production unit of the food industry was 20. At the end of

the 1970s the corresponding figure for the nation as a whole was slightly less than 70 persons. The size rationalization in the Skane food industry has ever since the war been faster than in the rest of the country. At the end of the seventies the mean amount of hired labor per production unit in Skane was 100 persons.

Since the middle of the 1960s about one tenth of the total value added of the Swedish industry resulted from the food industry. This figure is internationally very low. Among the developed industrialized nations only Japan, the Federal Republic of Germany and Italy score lower. Table 21 sums up the significance of the food industry in different industrialized nations since the middle sixties.

Table 21. The importance of the food industry in different industrialized nations.

Country	Average production share[a], 1968-1977, %	Yearly growth, 1968-1977, %
Philippines	40	4.7
South Korea	22	17.4
Denmark	21	3.6
Greece	20	3.7
Holland	17	2.6
Belgium	17	4.3
Australia	16	2.7
Austria	16	3.7
France	15	2.3
Norway	15	2.5
Canada	15	1.7
Finland	14	2.1
Great Britain	13	0.9
Spain	12	10.7
USA	11	3.4
Singapore	11	5.6
Sweden	10	1.4
Italy	10	3.9
FRG	9	3.1
Japan	9	3.1

[a]Production share = value added in food industry as a percentage of the industrial total.
SOURCE: Yearbook of Industrial Statistics, FN, 1980.

Table 21 shows that Sweden has not only an internationally seen relatively small food industry. Its growth is also uniquely slow. Among the developed industrialized nations only the English food industry has had a slower production growth.

The world growth of the food industry since the middle of the sixties has been, on average, slightly more than 4 percent per year. Hence, the Swedish food production growth has been equivalent to one third of the international demand growth only. Another significant aspect of the situation is that many countries which have assigned equal or even smaller investment resources to food industry, still have had a considerably faster production growth. Swedish food industry has since the middle of the sixties been in an extreme way aimed at the domestic market. Thus, it has been separated from the international demand development of the branch. At the end of the seventies in reality only one third of the Swedish food industry was subjected to competition.

The Skane food industry has since 1965 come up with an annual production growth of slightly more than 3 percent. Because of the slower growth in the rest of the country, a substantial part of the Swedish food production has been relocated to Skane.

The development of the food industry in Skane has created a situation in which the value added of the sector amounts to almost one forth (24 percent in 1978) of the total Skane industrial value added. Thus food production in Skane has achieved the same relative importance as in Danish industry. There is, however, one significant difference. Danish food production aims at competing on the world market, while the Skane food industry mainly deals with other Swedish regions, protected from international competition.

With its present market orientation the Skane food production depends in the first place on the income development of the Swedish households and on the comparative advantages of locating the main part of the national food production to Skane.

3.2. Production and Employment

The Skane food industry has in the seventies employed between 18,000 and 19,000 persons, who, during the later part of the period, were spread out over slightly more than 200 production units. Table 22 exhibits some of the essential facts.

Table 22. Production and employment in Skane's food industry.

	1973	1974	1975	1976	1977	1978
Number of production units	249	234	219	218	206	201
Sales value (current prices)	5,790	6,570	6,880	8,030	8,860	9,390
Value added (current prices	1,670	1,720	2,470	2,800	3,000	3,300
Value added (1975 prices)	2,150	2,050	2,470	2,690	2,670	2,670
Employment	18,450	18,460	18,270	19,440	19,230	19,420

SOURCE: Extraction from SCB Industrial Statistics.

In 1975 the average sales value per production unit was slightly more than 30 million Skr and the average value added a bit more than 10 million. Both these figures exceed by more than 50 percent the average values for food industry in the rest of the country.

3.3. Integration in the Agroindustrial Complex

The food industry constitutes one of the main sectors of the Skane agroindustrial complex. Its integration with the economy of Skane is characterized above all by its need for productive resources from the crop and meat production and by the transportation system.

The crop sector provides almost 20 percent and the meat sector slightly more than 30 percent of the intraregional ship-

ments of goods and services to the Skane food industry. Further, the intraregional shipments from one part of the food industry to another are considerable; these total almost 30 percent of the intraregional food industry intermediary shipments. The above three sectors together, then, constitute 80 percent of the intraregional supply market of the branch.

By using a national input/output table of the Swedish economy divided into 88 sectors, 13 of which are food sectors, it is possible to specify with some accuracy the position of food industry within the agroindustrial complex*. Table 23 ranks the food industry sectors according to their intermediate consumption of agricultural resources.

Table 23. The dependence of food industry on the domestic agroindustrial complex.

Subsector	Consumption share from domestic agroindustry (percent)	Food industry in Skane 1978	
		Production units	Employed
Fodder industry	55	14	470
Slaughteries	51	33	5,100
Mills	49	7	190
Dairies	41	22	1,140
Other food industry	40	15	750
Sugar industry	39	7	2,180
Oil and fat industry	37	5	380
Bakeries	23	58	1,980
Fruit canning ind.	23	12	4,960
Manufacture of chocolate and sweets	17	8	840
Fish canning industry	11	10	280
Beverage industry	5	10	470
Tobacco industry	4	1	700
Sum total		201	19,400

*Crop and meat production, greenhouse production, food and chemical industries.

Table 23 shows that many of the largest goods industry sectors are dependent on very close contacts with other units of the agroindustrial complex. We ought to add to the above consumption shares also the direct import dependency, the main part of which consists of products from agriculture, in the broad sense of the term.

Table 23. The total dependence of food industry on the agroindustry.

Subsector	Consumption share from domestic and international agroindustry, percent
Fodder industry	64
Slaughteries	57
Mills	62
Dairies	49
Other food industry	53
Sugar industry	63
Oil and fat industry	62
Bakeries	26
Fruit canning ind.	39
Manufacture of chocolate and sweets	28
Fish canning industry	45
Beverage industry	10
Tobacco industry	6

The volumes given in Table 24 sum up the total dependency of different parts of food industry on the agroindustrial complex. The table shows that most of the subsectors depend on agriculture for more than 50 units for the production of 100 units.

The intraregional output market of the food industry is strictly concentrated to the meat sector, the wholesale and retail trades and its own branch. In this way, around 40 percent of the total food supply of the region are reserved for the region itself and 60 percent are sold outside. The substantial extraregional deliveries are balanced by an approximately equal inflow from markets outside of Skane.

The food product trade of Skane, then, depends on other regions for most of its supply and sales markets. Hence, the decisive importance of the transportation sector for the Skane food production. The Skane food industry is hardly aimed at the world market at all. That its sales market is predominantly extraregional is a natural consequence of the fact that Skane produces 30 percent of the Swedish food but has some 12 percent only of the national population and incomes. That most of the supplies for the food sector are purchased outside Skane is due to the industrial specialization. The intraregional production can only provide a smaller portion of the demanded primary products and semi-finished goods.

3.4. Production and Profitability

On the basis of the value added we are able to specify the cost structure and the profit relations of the food industry. The value added shall primarily cover the labor cost. What then remains is the gross profit, which is to cover the fixed costs and the owner capital returns. Table 25 summarizes the average cost structure of the food industry between 1969 and 1978 on the basis of the gross profit share of the sector.

Table 25. Profit concepts and fixed costs within food industry; share of value added (percent).

Average gross profit	54
Minus: Overhead share	-11
Repair cost share	- 4
Other external costs	- 6
Gross returns share	33
Minus: Depreciation share	- 8
Net profit share	25

During the late 1960s the net profit share of the Skane food industry has amounted to an average of 30 percent, i.e., considerably more than the average for the rest of the country.

A more careful analysis and comparison of the different parts of the country reveals that the Skane food industry through the seventies has had the best profitability development in the country with a large portion of production and employment in production units with high profit shares.

Work-places with a gross profit share of at least 50 percent and a corresponding net profit share of at least 20 percent are responsible for almost 70 percent of the Skane food production and half of the sector's employment. Since the late sixties, the Skane food industry presents favorable conditions for the restructuring and expansion of capital.

Work-places with a gross profit share lower than 10 percent have minimal profitability. For most production units it means that neither the fixed costs nor the labor costs can be covered. Consequently, these work-places are under an acute threat of discontinuation. 10 percent of the employment in Skane's food industry have during the late part of the seventies been endangered in this way. Compared to the food industry in other parts of the country and to other sectors this figure is low.

Almost 30 production units within the Skane food industry in the late 1970s suffered from minimal profitability. Under normal conditions we can expect these units to be shut down before the middle of the 1980s. In the long run the profitability must cover the normal depreciation costs. For the normal food industry work-place this means a gross profit share of at least 30 percent. During the late seventies not quite 130 out of slightly more than 200 production units in Skane met this long-term condition. The employment at these work-places during the period in question amounted to 15,000 persons.

Assuming a continuation of the slight national growth in food industry (as in the sixties and the seventies) and a slight increase of the disposable income of the households during the 1980s, a continued shutting-down of low-profitability units seems likely.

Skane has to count upon the close-down of between 50 and 70 work-places before 1995 under the assumed conditions. This reduction would equal the number of units which during the seventies were unable to cover their fixed costs in a satisfactory way.

In the seventies the capital intensity of the food industry increased substantially. Between 1970 and 1979 it increased nationally by 45 percent from almost 190,000 Skr per employee in 1970 to slightly more than 270,000 Skr in 1979. The investment trajectory underlying this development caused the investment volume per year and employee to be 15,000 Skr in the average (prices of 1975). It must be noted, that this figure is an average for all production units without regard to their profitability level.

In reality the investment per employee in food industry corresponds to the profitability level of the work-place. At work-places with high profitability (gross profit share exceeding 50 percent) the investments per employee have amounted to slightly more than 18,000 Skr (average for the 1970s in prices of 1975). On lower levels of profitability the investment per employee has averaged 12,000 Skr, see Table 26.

Table 26. Investments per employee in food industry; national averages in 1975 prices.

Gross profit share	1972	1973	1974	1975	1976	1977	1978	Average
50	19,600	15,700	18,800	18,700	15,500	17,800	20,800	18,100
30-50	9,000	9,400	10,400	18,100	12,200	11,300	12,400	11,800
10-30	12,000	8,200	25,500	9,600	10,100	6,600	6,400	11,200
10	19,900	16,800	13,700	4,900	9,800	14,300	5,600	12,100

SOURCE: Computations from SCB Industrial Statistics. Firm survey material and National Accounts.

Differences in capital formation depending on varying profitability levels obtain special importance for the Skane food

industry. Weighting the investment per employee in different profitability groups by the employment in the same groups we find the average investment per year and employee in Skane to be almost 17,000 Skr. This value enables us to calculate the annual investment volume of the food industry in Skane: a bit more than 300 million Skr. Since the national annual investment volume during the seventies was slightly more than 1,000 million, the Skane share was 30 percent.

We further observe that work-places with a larger gross profit share than 30 percent--i.e., units with positive net profits--have been responsible for 70 percent of the national capital formation within the food production. Given the Skane profitability pattern, those sector units which are economically sound in the long-run will account for 80 to 90 percent of the capital formation.

3.5. Location Patterns and Land Use

The major centers of food production in Skane are the regions of Malmö, Helsingborg, Kristianstad, Eslöv and Kävlinge, as may be seen in Figure 22. In the late seventies the food industry of these regions accounted for almost 80 percent of the total sector employment in Skane. Two of these centers--the largest and the smallest ones, Malmö and Kävlinge--belong to the SSK area which has some 40 percent of the food industry employment in Skane. Except for Malmö, the food industry is concentrated to regions outside the southwest of Skane in the first place.

The distribution of the food industry in the late seventies in Skane is given in Table 27 in the zonal division defined in Figure 22.

On the basis of various sources we have estimated the average land use of the Skane food industry to be 8 employees per hectare of real estate land, Malmö excluded. For Malmö we have estimated

Table 27. Intraregional employment structure in food industry.

Subregion	Share of total employment (%)
Kävlinge	5
Lomma	0
Lund	1
Staffanstorp	3
Burlöv	4
Malmö	27
Svedala	0
Vellinge	0
Trelleborg	1
Southwest	41
Rest of Skane	59

SOURCE: SCB Industrial Statistics.

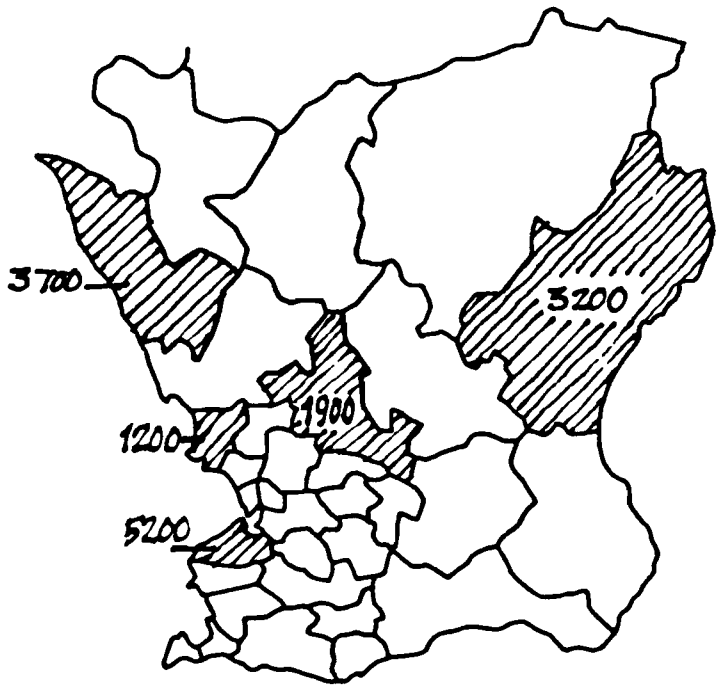


Figure 22. Larger concentrations of food industry in Skane.

20 employees per hectare. The total land use of the Skane food industry would then amount to almost 35 percent of the total industrial real estate area of the region.

In Southwest Skane as a whole 600 hectares and in the rest of Skane 1,400 hectares would be the total food industry land use in the middle of the 1970s.

Land use per employee may be expressed in the following simplified way: (land/employee) = (land/capital) · (capital/employee). This means that the land use per employee consists of the product of the capital intensity of the production (capital/employee) and the land use per capital unit (inverted exploitation degree).

Proceeding on the assumption that the long-term degree of exploitation of food production in Skane as well as the employment level will remain unchanged the land demand of the branch will be determined by the development of the capital intensity. How much land will be needed by the sector does not, however, follow from this directly. The capital intensity path is on the one hand a question of shutting down obsolete industrial capital and on the other hand of restructuring profitable units, and of the addition of new units.

As demonstrated already, the long-term reduction of food industry needed in Skane concerns 3,000 to 4,000 work-places whose remaining capital formation is negligible and whose land in the long-run may be given an alternative use. On the other hand, we have shown that normal capital formation in economically sound units amounts to about 250 million Skr per year (at 1975 prices), i.e. 2.5 billion Skr in ten years.

On these grounds we can illustrate the change in the land demand of the food industry in the next ten years, using the following examples:

1. If the capital intensity of the food industry increases by 30 percent and the exploitation degree remains constant a further 600 hectares will be needed.
2. A reduction of the obsolete industry capital equivalent to 3,500 work-places would free 350 hectares of land.

On the basis of these assumptions the net land demand of the sector would increase by 25 hectares per year.

3.6. Transport Costs and Energy Use

In connection with the food industry location pattern we want to elucidate the transport costs of the sector, or to be precise, the costs for the shipping out of products from the food industry. The food product transports are characterized by smaller freight units and somewhat shorter mean distances than the average for Swedish industry. An increase in transport distances by 10 percent causes an increase in transport cost per ton by slightly more than 4 percent, i.e. the distance elasticity is slightly more than 0.4. The shipped out products of the food industry also have a high "specific" weight in relation to their value content. The average weight shipped out amounts to more than 600 tons per million Skr of market value. This means that the transport costs per "market unit" are about ten times higher for the food industry than for the equipment industry. Figure 23 demonstrates the situation.

The energy use intensity of food industry exceeds the industrial average. In the case of Skane this means that the sector accounts for a substantial part of the total industrial energy use. At the end of the 1970s the electricity use of the food sector was slightly more than 400 GWh per year. The consumption of liquid fuels at the same time amounted to 215,000 cubic meters per year.

The spread in energy density within the sector is significant. The most electricity-intensive parts use 69 MWh per

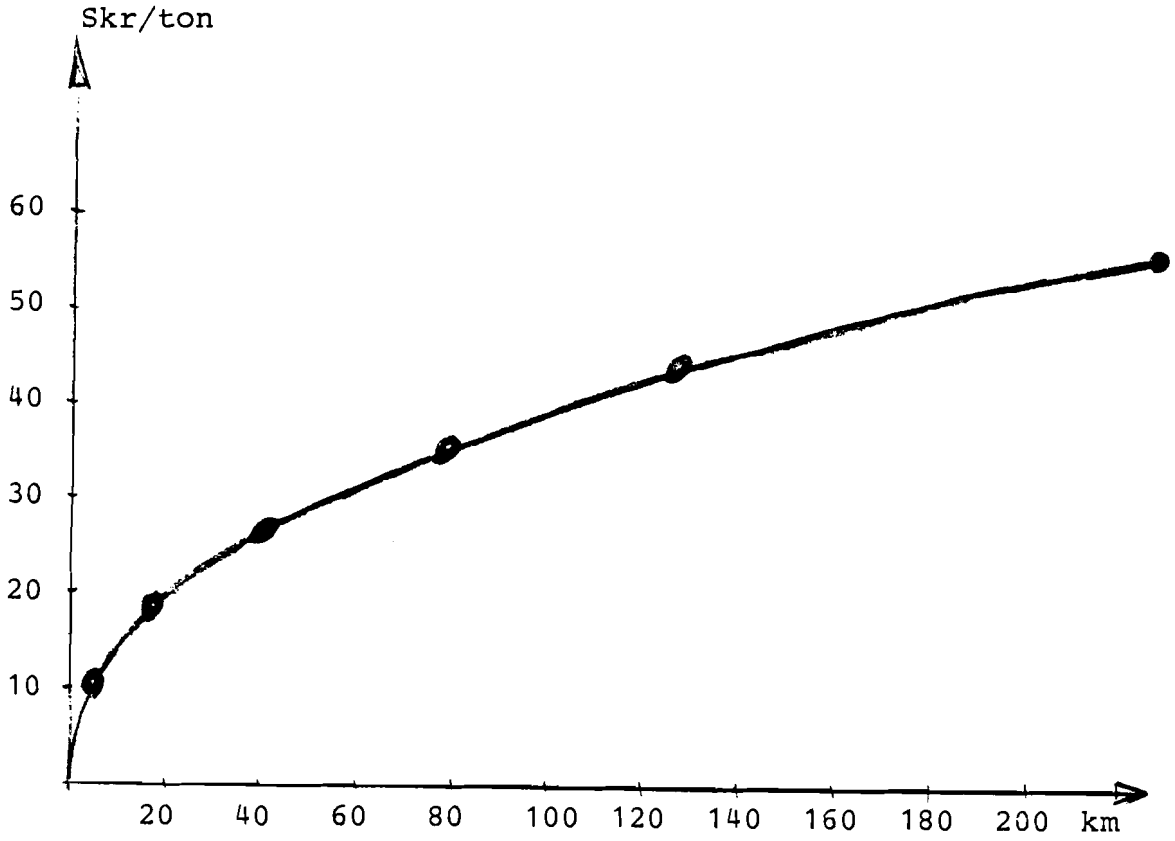


Figure 20. Estimated transport cost function for food products. Transport cost/ton = $5.26d^{0.44}$; where d = road distance in km. F-value = 150.

employed person. This part of the food industry also has the highest productivity. The least electricity-intensive subsectors consume 7 MWh per employed person annually. This intensity is found among the least productive parts of the sector.

The use of liquid fuels is also quite widespread. The lowest value is 4 cubic meters per employed person and year and the highest value is 48. In this case the variation does not follow that of productivity. We can consequently expect a restructuring of the Skane food industry to bring about an increased use of electricity.

3.7 Productivity and Cost Structure

In conclusion, we shall summarize the entire productivity and cost structure of the Skane food industry and compare it to the corresponding national structure.

The cost structure in 1975 and 1979 is shown as supply curves--the production units have been ordered according to increasing costs in percentage of the value added. Figures 22 and 23 demonstrate that the food industry in Skane in 1975 and 1979 had a considerably more favorable cost structure than the rest of the Swedish food industry. Both curves show that only a minor part of the production had variable costs exceeding the income. The main part of the production is concentrated to units in which the labor costs are less than 50 percent of the value added. The profitability of these units surpasses the average of Swedish industry by more than 100 percent.

Figures 24 and 25 sum up--for 1975 and 1977--productivity measured as value added per employee. The Skane food industry has a higher productivity than the food industry in the rest of the country in almost all profit classes. In both figures the labor cost levels of the years in question are indicated. It is demonstrated that the production units which need to be shut down acutely account for not quite ten percent of the sector's employment in Skane. The units threatened by discontinuation in the long-run--for not covering their fixed costs in a satisfactory way--are those with a productivity of less than 100,000 Skr in 1975 and less than 120,000 Skr in 1977. We are furthermore able to assert that the Skane food industry has a major productivity advantage even within the highly productive part of the Swedish food industry.

On the basis of the productivity curves in Figures 24 and 25 which describe the wage-pay capacity of the food industry, it is possible to estimate the sensitivity of the sector to labor cost variations. Figures of this kind can be considered static demand curves for labor, showing that the wage-pay capacity decreases as plants with an even lower productivity are taken into operation.

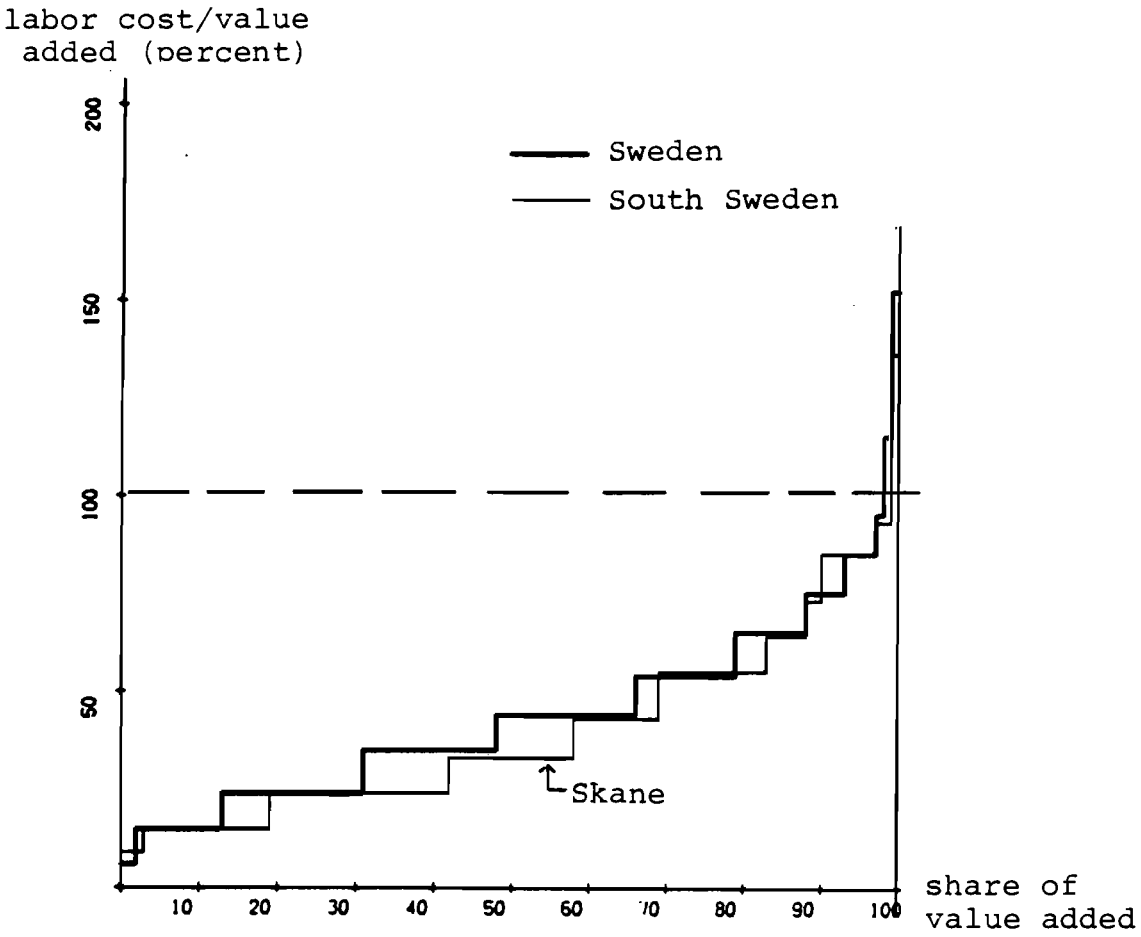


Figure 22. Supply curve for Skane's food industry 1975, compared to the national average.

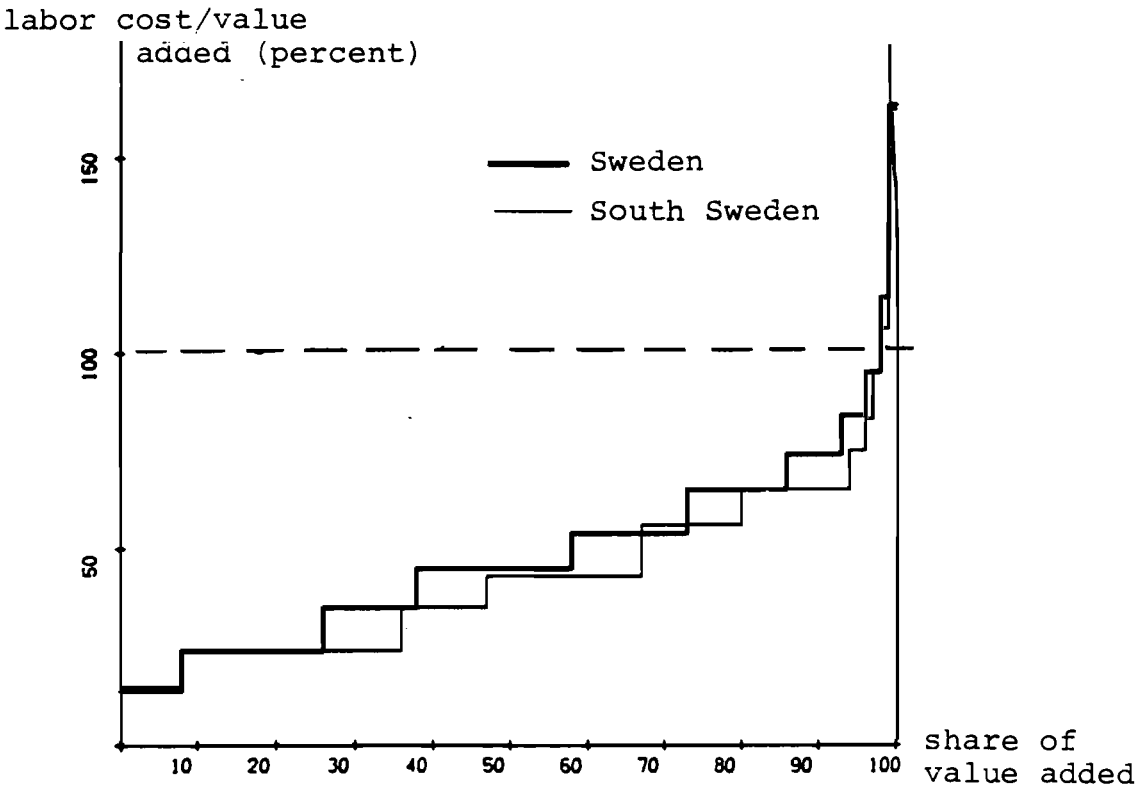


Figure 23. Supply curve for Skane's food industry 1978, compared to the national average.

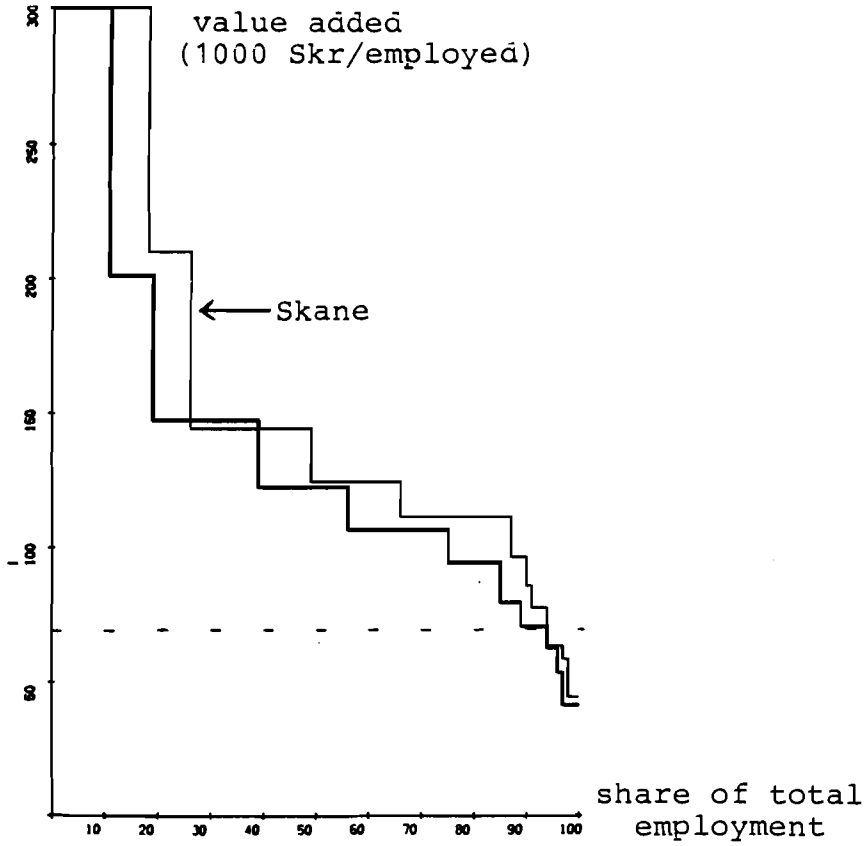


Figure 24. Productivity pattern in the food industry in Skane 1975 compared to the national average.

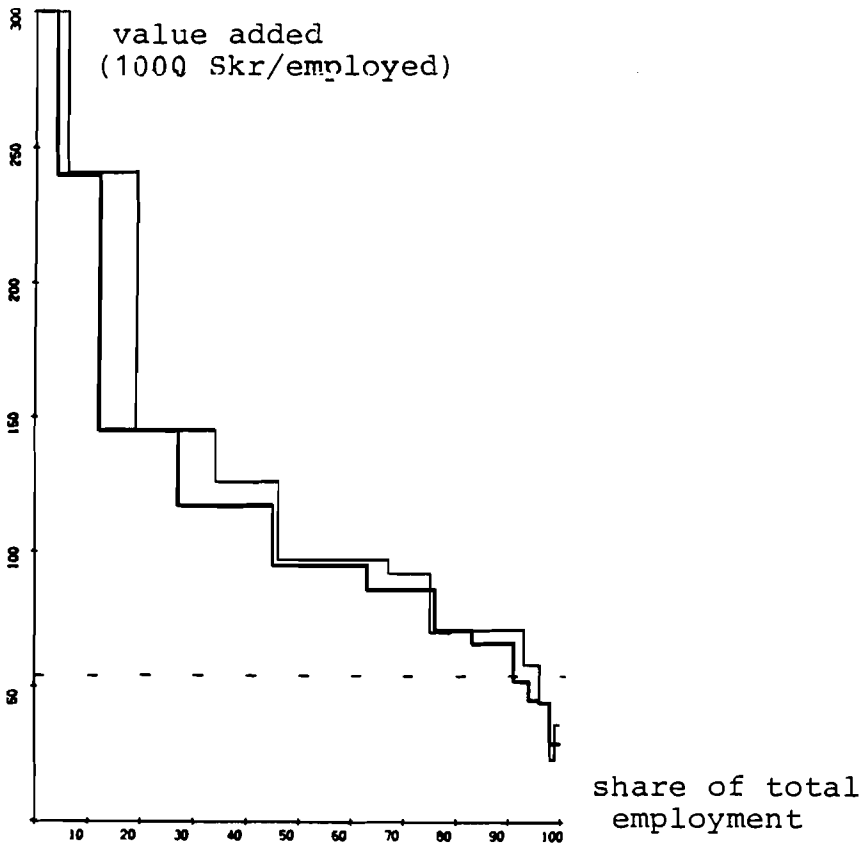


Figure 25. Productivity pattern in the food industry in Skane 1977 compared to the national average.

Calculations of this kind have been performed for the development of the demand curves of the food industry for the entire period between 1968 and 1978. The estimates turn out to be statistically highly verifiable.*

Generally the food industry has a very low labor cost elasticity which means that its labor demand is insensitive to labor cost variables, see Figure 26. The Skane labor cost elasticity for food industry is, in addition, below the national sector average. A 10 percent increase in the real-term labor cost level of the sector reduceds its labor demand by slightly more than 2 percent and vice versa. The low labor cost elasticity in combination with the orientation towards the domestic market make the labor demand of the Skane food industry almost completely insensitive to changes in the Swedish cost structure.

3.8. Best-Practice Plants and Their Efficiency Profiles

To determine the characteristics of newly established or restructured units of food industry we have investigated so-called best-practice plants. Best-practice production techniques in the food industry units have been defined through a ranking of all Swedish food inustry units according to their value added per employed person. Two kinds of technology have been analyzed--decentile and quartile technologies. The first kind consists of units which compose the productivity-wise "top ten" of the sector. This means that we have selected those work-places that form the first decentile of the static demand curve. Quartile technology, on the other hand, refers to the average consumption values of the units composing the first quartile of the demand curve for labor. The principles adopted for selecting best-practice plants is given in Figure 27.

---

*Source: Labor cost elasticities for Swedish industry; SIND 1981. Estimated demand function for the Skane food industry
$\ln(z/1-z) = 1.46 - 0.21\mu + 0.083\ t$
μ = value added per employed person
z = share of employment with a higher productivity than μ
t = trend factor

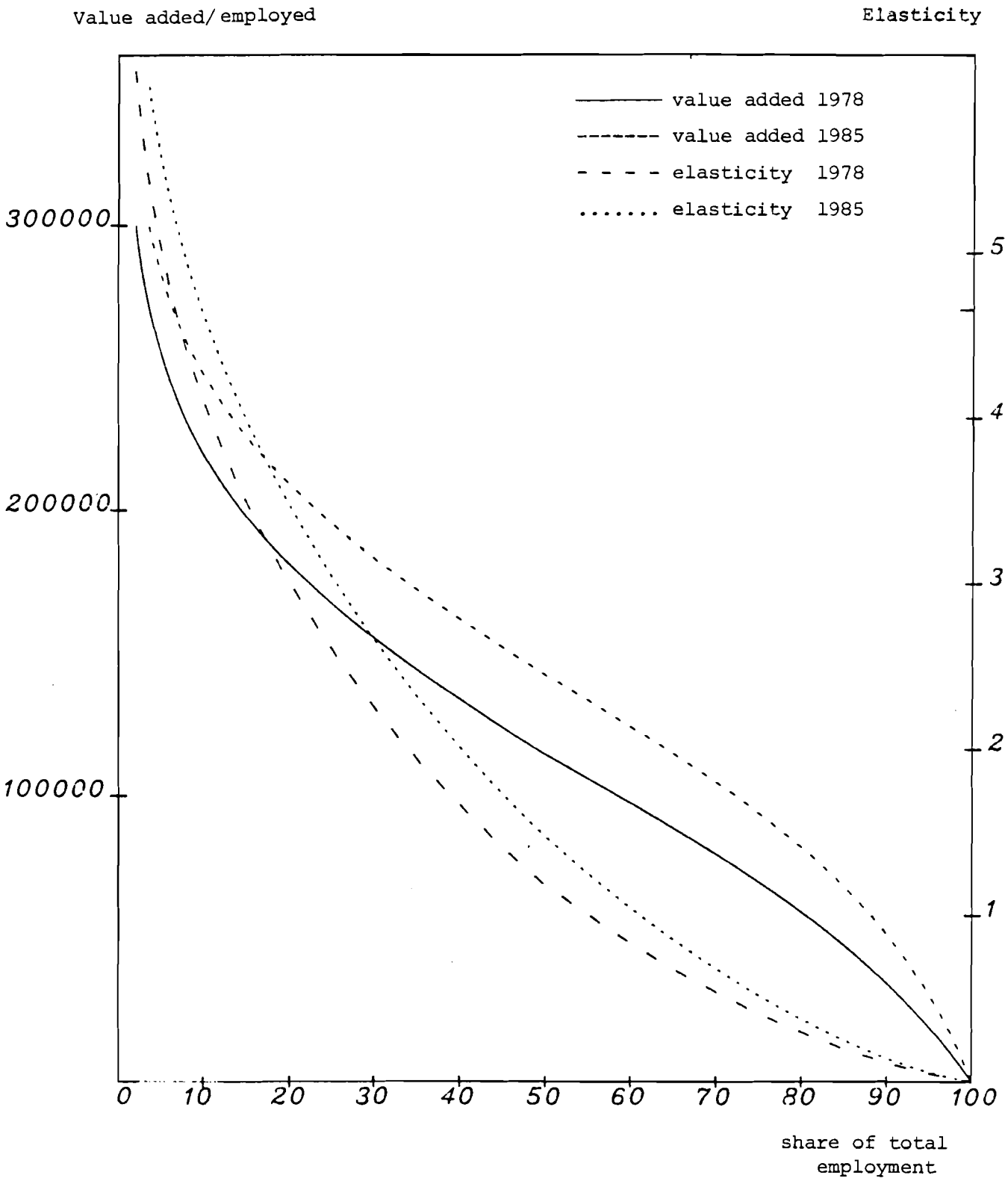


Figure 26. Estimated demand functions and labor cost elasticities for the food industry in Skane. Data for 1968-1978 in 1975 prices.

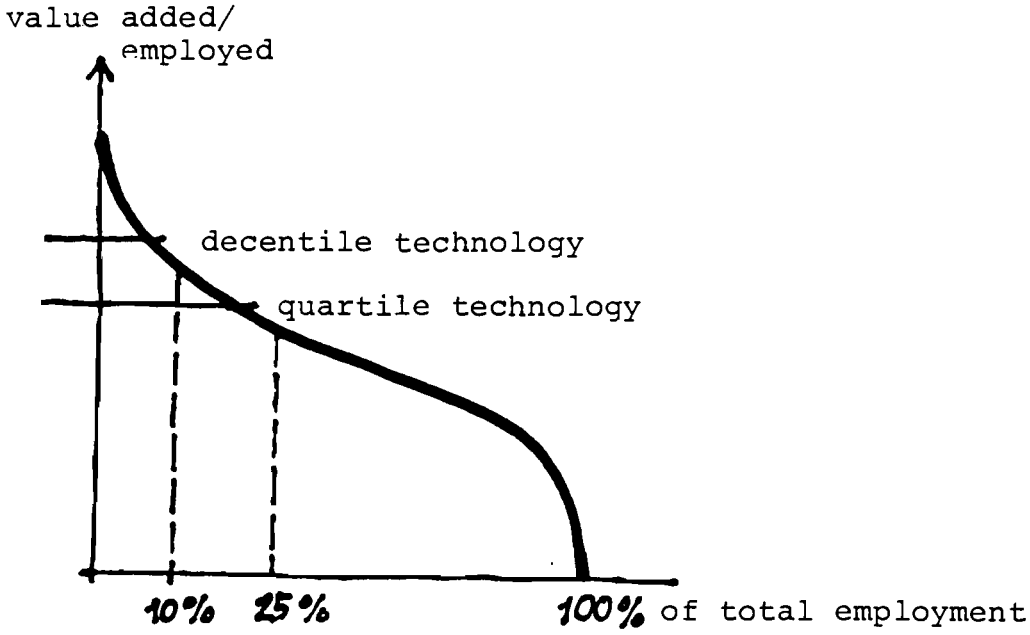


Figure 27. Principles for determining best-price establishments.

Table 28. New establishment technologies for the food industry (1975 prices)

	Technology	
Dimension	Decentile	Quartile
Value added per employee	390,000 Skr	301,000 Skr
Oil use per employee	7.3 m^3	13.5 m^3
Electricity use per employee	49 MWh	37 MWh
Investment per employee	1,330,000 Skr	1,020,000 Skr
Sales per employee	1,139,000 Skr	813,000 Skr

SOURCE: Computation from the data base of the Swedish Industrial Board.

Productivity at decentile plants is around 2.5 times higher than the average of the Skane food industry, see Table 28. At quartile plants productivity exceeds the average by 100 percent. Thus restructuring can lead to major productivity increases which for a limited domestic market by necessity must result in a decreased labor demand.

3.9. Summary of Basic Facts

- The production growth of the Swedish food industry has during the entire post-war period been sluggish. Since the middle of the sixties it has equaled only 1/3 of the international demand growth of the sector.
- The Skane food industry is like the rest of the Swedish food industry one-sidedly aimed at domestic production.
- The Skane food industry is responsible for 30 percent of the national capacity of the sector which means that food production accounts for one fourth of the total production capacity of the industry in Skane.
- As a part of the agroindustrial complex of Skane, the food industry in the region has a considerable productivity advantage over the sector in the rest of the country.
- If the market orientation remains constant the employment development in the Skane food industry is limited by the domestic demand development.
- Under the same assumption the development of the food production in Skane remains primarily a question of the advantages in concentrating the branch to this part of the country.
- The capital output ratio in Swedish food industry has, during the seventies, been 2.3. For Skane, we can presuppose a capital ratio of 2.5 at least, which indicates an average gross profit in the Skane food industry of slightly more than 15 percent in the 1970s.
- In the 1980s we have to count upon the discontinuation of 50 to 100 production units of the Skane food industry.

The number of jobs in these units amounts to 4,000 to 5,000. It should be possible to recreate the same number of jobs by expanding and restructuring the economically sound units of the branch.

- The capital formation will amount to at least a quarter of a billion Skr annually (prices of 1975) corresponding to 15,000 to 20,000 Skr per year and employee.
- The land demand of the branch will keep pace with the shutting down of obsolete units and the expansion and restructuring of the rest. A rough estimate of the net demand increase indicates 25 hectares per year.
- In conclusion it must be stressed that the present conditions of development for the food industry depend on an unchanged agricultural policy. Changed conditions might quickly influence the profitability situation of the sector and change the concentration advantages of Skane. Finally it ought to be emphasized that the favorable capital returns of the sector would easily allow a more expanding orientation towards the world market.

4. CHEMICAL INDUSTRY IN SKANE

4.1. Position in the World Market

The entire chemical industrial sector including production of chemicals, paint, drugs, fertilizers, petroleum, plastic and rubber products, is better developed in Skane than in any other Swedish region. In the late seventies it has accounted for slightly more than one fifth of the total value added of the Swedish chemical industry.

The chemical sector of the Swedish industry has during the 1970s consisted of more than 800 production units and--on an average-- 66,000 employees. Compared to the 1950s the sector has expanded by some 300 units and has doubled its employment. Until the end of the sixties also the Skane chemical industry expanded substantially. During the seventies, however, the sector as a

whole has undergone a poor development in Skane. From 1973 to 1978 the employment decreased by a bit more than 2,000 persons and 20 production units were shut down. Hence, the Skane chemical sector has been less responsive to the international demand growth and capacity expansion of the sector in the time between 1966 and 1978.

Since the middle of the sixties only the electrical industry has had a faster production growth globally than the chemical industry. During this period, chemical industry production in the developed market economies has grown 70 percent quicker than the average for industry in these countries (Table 29).

Table 29. The international development of chemical industry 1966-1978. Percentage increases.

Region	Production growth per year	Growth advantage relative to average industry (%)	Employment growth per year
Globe	7.2	39	2.6
Developed market economies	6.3	70	1.0
Western Europe	5.6	51	1.1
EC	5.6	70	0.7
Sweden	7.1	90	1.8*

SOURCE: Yearbook of Industrial Statistics, UN, 1980.
*1968-1978

In spite of the fast growth of the Swedish chemical sector during the fifties and sixties Sweden by international comparison has a poorly developed chemical industry. In a comparison of the relative importance of chemical industry in industry as a whole Sweden comes among the last of the industrialized nations of the West, see Table 30.

During the later part of the 1970s chemical industry in Skane accounted for 15 percent of the total industrial value added of the region. Hence Skane is the only part of the country whose chemical sector reaches the same average level as in the most

Table 30. The relative importance of chemical industry in different industrialized nations. Average for the period 1966-1977.

Country	Chemical industry's share of industrial value added (%)
France	19
Italy	18
Holland	17
USA	15
Japan	15
Great Britain	14
FRG	12
Austria	12
Denmark	12
Canada	12
Norway	11
Finland	11
Sweden	10

SOURCE: Yearbook of Industrial Statistics, UN, 1980.

important competitor countries of Swedish. This should mean that the Skane chemical industry has obtained the same agglomeration conditions as in other industrialized nations. As a consequence, the slow development of the sector during the seventies strikes out as noteworthy.

4.2. Production and Employment

During the later part of the 1970s the total chemical industry in Skane employed 16,000 persons on the average. As may be gathered from Table 31, almost one third was accounted for by the rubber product industry alone. The concentration of this subsector to Skane is the main reason why the chemical industry of the region has a different production structure from the rest of the country. Table 31 makes clear that Skane has a relatively small plastic industry. Starting from 1975, the sales value per

Table 31. Employment profile of chemical industry in Skane and the rest of Sweden during the late 1970s.

Subsector	Skane, %	Rest of Sweden, %
Chemical industry proper	56	60
Petroleum industry	4	4
Rubber industry	29	14
Plastic industry	11	21
Chemical industry total	100	100

SOURCE: SCB Industrial Statistics.

production unit of the Skane chemical industry was 25 million Skr or 0.2 million per employee. Both these figures are considerably lower than the average for the sector in the rest of the country. This fact, however, does not allow us to conclude that the Skane chemical industry works on a generally small scale of production or has a low productivity. The ratio between the value added and the sales value reveals that its orientation towards refinement is stronger than in other parts of the country.

Table 32 summarizes production and employment of the chemical sector in Skane in 1970.

Table 32. Production and employment in the chemical industry in Skane.

	1973	1974	1975	1976	1977	1978	1979
Number of production units	157	157	147	143	141	136	138
Sales (current prices, million Skr)	2580	3610	3730	3750	3990	4240	4840
Value added (current prices)	1380	1640	1860	1910	2060	2110	2320
Value added (1975 prices)	1830	1760	1860	1680	1580	1520	1550
Employment	17610	17460	17150	16880	16100	15670	15890

SOURCE: Computations from SCB Industrial Statistics.

The development of production and employment of the entire sector is shown to have been very negative since 1974. Only part of the stagnation can be attributed to the rubber industry.

The productivity and profitability pattern of the chemical sector in Skane is very dispersed. On one hand we find a considerable part of the most productive units of the country in Skane and on the other hand a large number threatened by close-down.

Since 1974 the most acute threats of discontinuation have concerned 7 percent of the chemical industry employment, 10 percent of the plastic industry employment and 40 percent of the rubber industry employment. For both the first and the second subsectors these levels are lower than the national average. Of the national rubber product industry, however, only 15 percent have been directly unprofitable. The short-term problem of market-exits thus concern almost 20 production units. In the long run the units must be able to cover the depreciation costs in addition to their maintenance costs and normal overhead costs. The chemical industry thus needs gross profits exceeding 30 percent of the value added (20 percent for the plastic and rubber industries). In the late seventies 45 production units with 6,900 employees could not meet this intermediary development requirement. We might therefore expect considerable structural change in the Skane chemical sector all through the eighties.

4.3. The Integration with the Regional Production System

Not quite four fifths of gross production in the chemical sector in Skane are sold on markets outside the region. Within Skane, the output market of the chemical industry is primarily constituted by the agricultural sector (crop production), the equipment industry, the wholesale and retail trades, and the sector itself.

In Table 33 we have ranked the subsectors of the Skane chemical industry. The largest subsector is other rubber products

Table 33. Dominant markets of the chemical industry. Subsectors of chemical industry in Skane size-ranked in 1979.

Subsector	Employment 1979	Dominant market within the production system 1st rank	2nd rank	3rd rank
Other rubber	3720	Machinery	Rubber	Electrical
Chemicals	2890	Pulp and paper	Chemicals	Basic plastic
Fiber and plastic	2060	Plastic	Construction	
Plastic	1760	Food	Machinery	Wholesale
Drug	1490	Drugs		
Other chemical	1360	Construction	Chemicals	Metal goods
Tyre	750	Vehicle	Transport services	
Fertilizer and pesticide	740	Crop		
Grease, asphalt and coal	622	Transport services	Construction	
Detergent	330	Beverage	Private services	
Color	180	Construction	Metal goods	

industry. Next comes the chemical industry and then the plastic and synthetic fiber industry. Each of these has more than 2,000 employees. These three big subsectors are major subcontractors for important industrial sectors in Skane. Among chemical industry subsectors with 1,000 to 2,000 employees the food industry, the production of chemicals and the drug industry are important market components. The fertilizer industry which is heavily concentrated to Skane sells 85 percent of its production to the crop sector. The table also shows that many parts of the chemical sector produce important intermediary goods for the Skane equipment industry.

4.4. Location Patterns and Land Use

As shown in Figure 28 most of the chemical industry in Skane is located in four regions: Helsingborg, Trelleborg, Malmö and

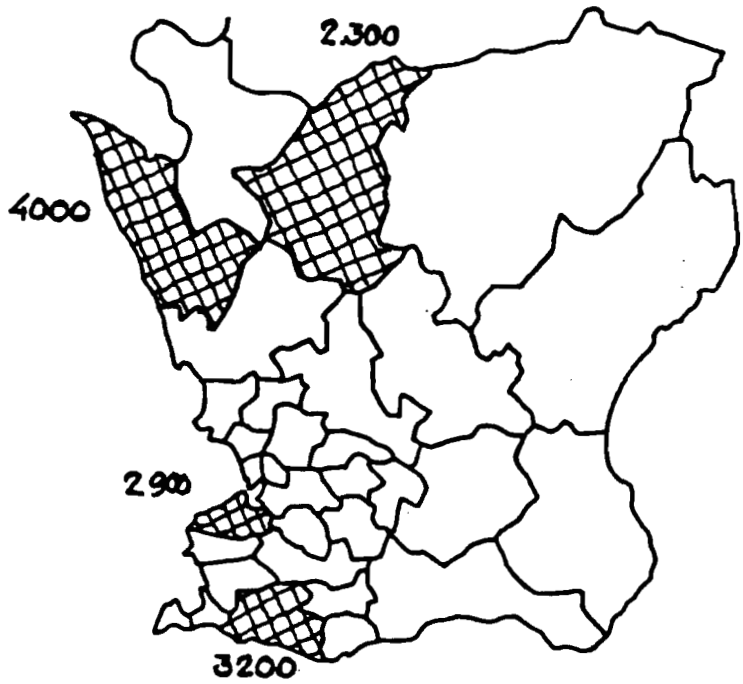


Figure 28. The main concentrations of chemical industry in Skane in the late 1970s.

Klippan. In the late seventies the chemical industry in these parts of Skane accounted for almost 80 percent of the sector's employment. Hence, the degree of concentration equals that of the food industry. Southwest Skane has approximately the same share of chemical industry as of food industry, i.e., slightly more than 40 percent of the employment.

The land use is relatively extensive for major parts of the chemical sector. The reason is that most of the chemical industry is capital intensive process industry. In the Stockholm region, for example, the number of employees per hectare was almost 20 in the beginning of the 1970s. For Skane we have estimated an average of 16 employees per hectare for the chemical sector as a whole during the late part of the seventies.

The above value makes the total land use of the chemical industry in Skane in the late seventies a bit more than 1,000 hectares, which is the equivalent of the average cultivation area of more than 30 Skane farms. In southwest Skane we must consider firstly that the chemical industry is concentrated to Malmö, secondly that a major share of it is rubber industry with a more intensive land utilization than the average within the sector. For southwest Skane we have estimated an average work-place density corresponding to 25 employees per hectare. According to this figure the land use of the chemical sector in southwest Skane amounts to 280 hectares.

From 1963 to 1979 the capital intensity in the Swedish chemical industry (including rubber industry but excluding petroleum industry) grew by 3.5 percent annually on the average. If this value along with the following expression is used for projections it is possible to estimate future changes in the land use of the chemical sector.

(Land/employee) = (land/capital) x (capital/employee)

Assuming the degree of exploitation to remain unchanged, we conclude that the land use per employee will follow the growth trend of the capital intensity of the sector. Changes in land use are further assumed to occur in connection with investments, restructuring and market-exits.

The following example is based on the assumption that the long-term total employment volume of the Skane chemical sector will remain unchanged. In the perspective of 5 to 15 years we foresee a need for restructuring within the sector concerning slightly more than 7,000 jobs. With these assumptions we may derive the following consequences for the land use:

- a gross demand for land connected to industrial renewal, 700 hectares;
- additional land from removal of obsolete work-places in existing work-place zones, 450 hectares;

- a net change in total land use of 250 hectares, implying a need for 10-15 additional hectares per year depending on the speed of the structural change.

This example shows that the land use of the chemical sector would increase by 1.0-1.5 percent yearly. The assumption is that the total employment of the sector will remain unchanged. If it were to increase by 1.0 percent a year 1980-2000 the new land demands would increase to some 25-30 hectares per year.

4.5. Transport Costs and Energy Use

Products of the chemical industry have relatively long domestic transport distances. Costs for reloading and terminal are on the other hand relatively low. According to estimated transport cost functions for chemical industry, the transport cost per ton increases by slightly more than 5 percent (see Figure 29) for a ten percent increased in transport distance.

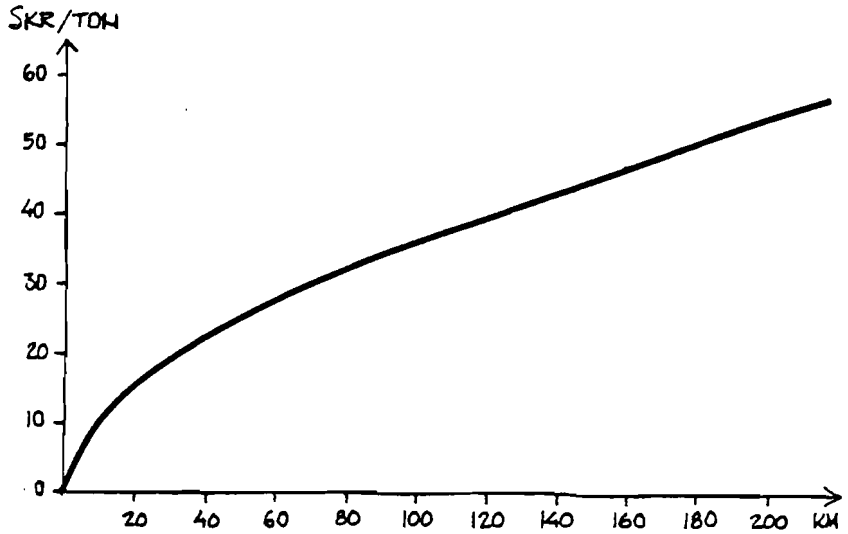


Figure 29. Estimated transport cost function for chemical products.

Parts of the chemical sector, in particular the production of chemicals, belong to the most energy-intensive branches of Swedish industry. During the later part of the 1970s the Skane chemical sector accounted for 27 percent of the total industrial use of electricity in the region, or 580 GWh per year. The chemical industry is also a major consumer of liquid fuels.

The annual consumption in Skane amounted to slightly more than 130,000 cubic meters in the late seventies.

The most electricity intensive parts of the chemical sector in Skane use 75 MWh per employed person and year. Plastic industry provides the lowest figure: 15 MWh per employed person and year.

Disregarding the oil use of the petroleum industry we find the most oil-dependent production units among the most profitable subsectors of chemical industry in Skane. These units used during the late seventies 27 cubic meters per employed person and year. Parts of the plastic industry have the lowest oil consumption within the chemical sector in Skane: 0.7 cubic meters per employed person and year.

Both restructuring and growth of the chemical sector in Skane can be expected to lead to an increased use of both electricity and liquid fuels.

4.6. Supply and Profitability Structures

In the following we analyze the chemical industry of Skane in terms of so-called supply curves. Curves of this kind demonstrate how the labor cost share increases as we begin with the most profitable units of the respective sector and add production units having an ever increasing cost share for labor.

In Figure 30 the cost structure of the chemical industry in Skane in 1978 and 1968 is summarized. It is clearly shown that almost the entire sector suffered from an impaired cost profitability structure in the late seventies compared to the late sixties. It must be emphasized, however, that the supply curve for the Skane chemical sector toward the end of the 70s is one of the most favorable to be found among all sectors and regions in Swedish industry at that time. The fact that the chemical industry has a better profitability structure in Skane than in the rest of the country is demonstrated in Figure 31.

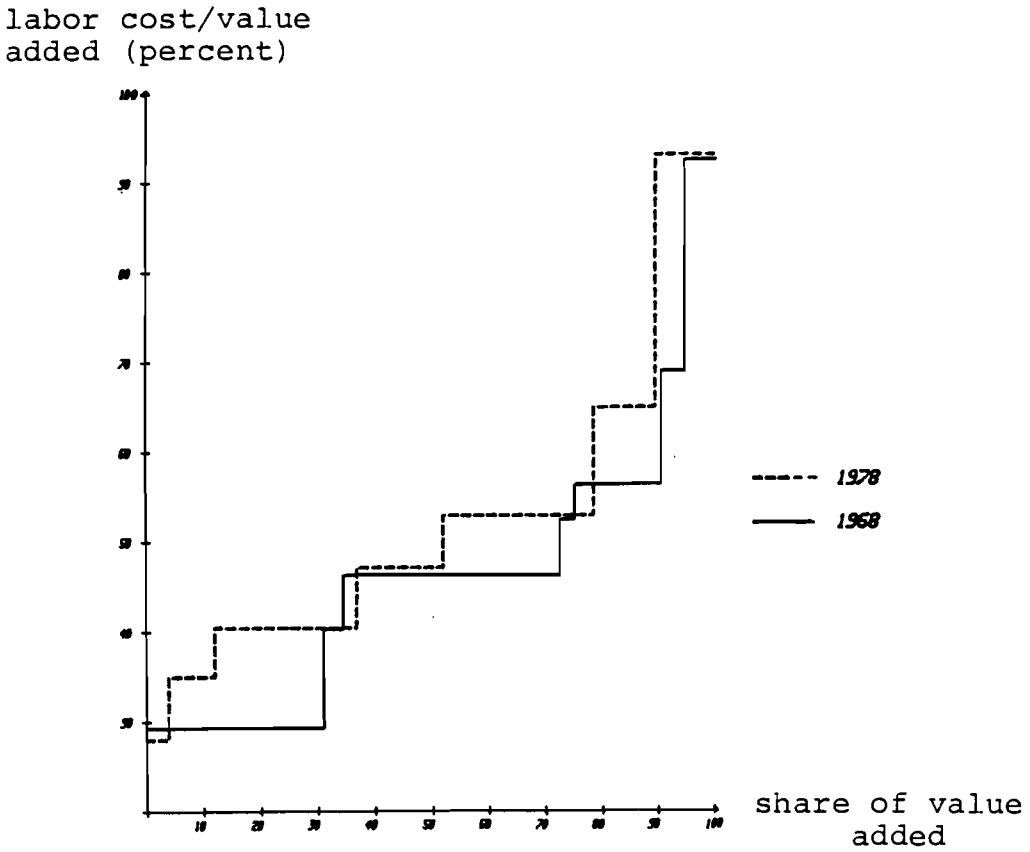


Figure 30. Supply function for chemical industry in south Sweden.

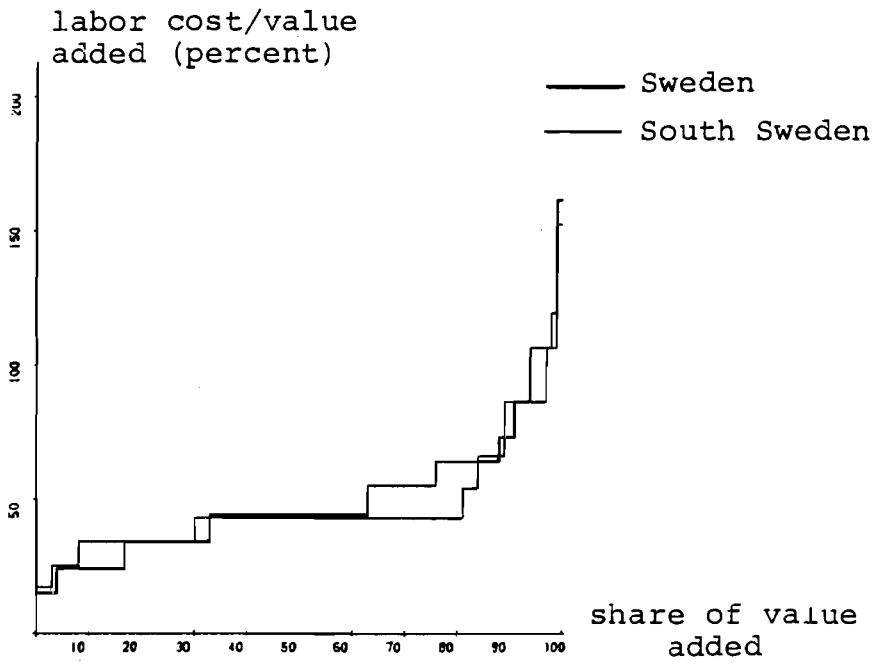


Figure 31. Comparison between the supply structure of chemical industry in South Sweden and in Sweden, 1975.

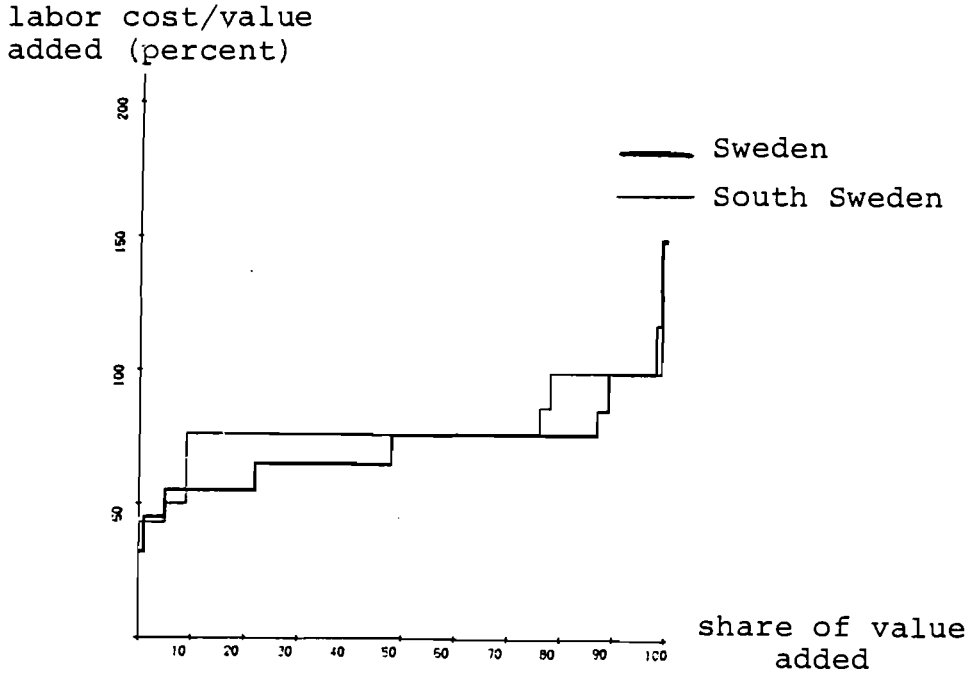


Figure 32. Comparison between the supply structure of the rubber industry in South Sweden and Sweden, 1975.

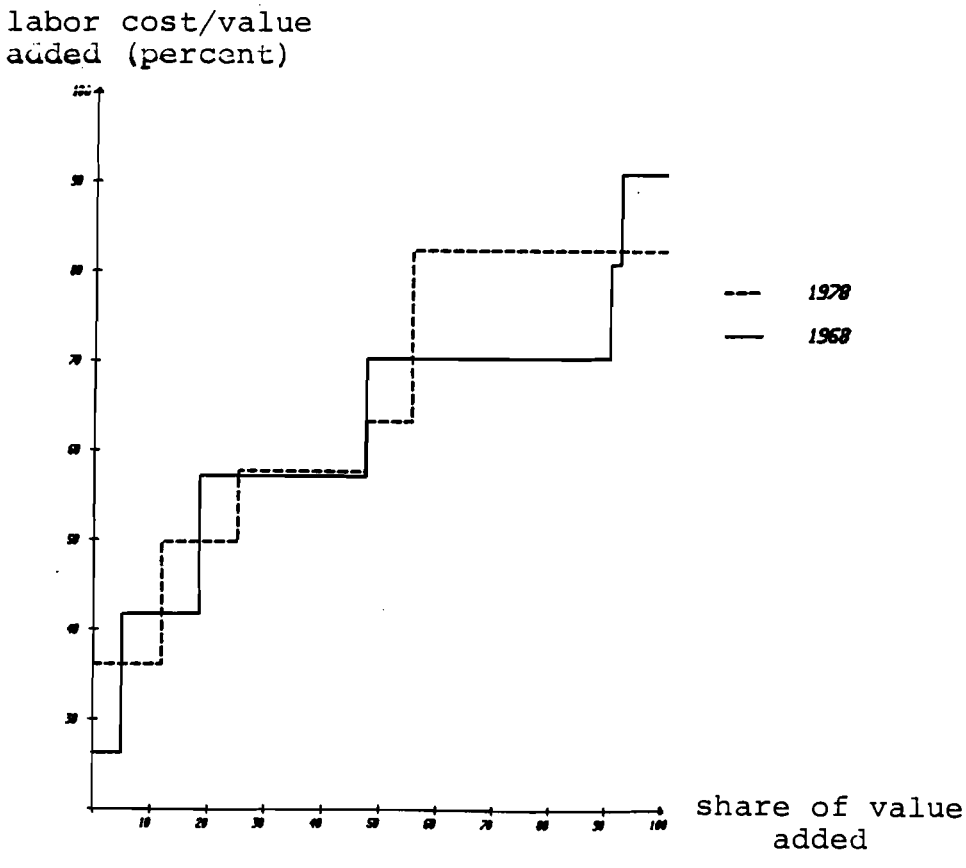


Figure 33. Supply function for the plastic industry in South Sweden, 1968 and 1978.

In the case of the Skane rubber industry, Figure 32, we note a considerably worse profitability structure in the late seventies than for the same sector in the rest of the country. Also the Skane plastic industry cost structure failed to equal that in other parts of Sweden during the same period of time, see Figure 33.

First and foremost we observe a decisive profitability decrease in the most exposed parts of the sector. Slightly more than two thirds of the sectoral production were during the late seventies manufactured for minimal proceeds.

4.7. Productivity and Labor Demand Structure

If the work-places in an industrial sector are ordered according to decreasing productivity measured as the value added per employee, a curve as the one in Figure 34 will result. Such a curve can be seen as a static demand curve for labor. The curve describes that the wage-pay capacity decreases as units with an ever lower productivity are taken into operation.

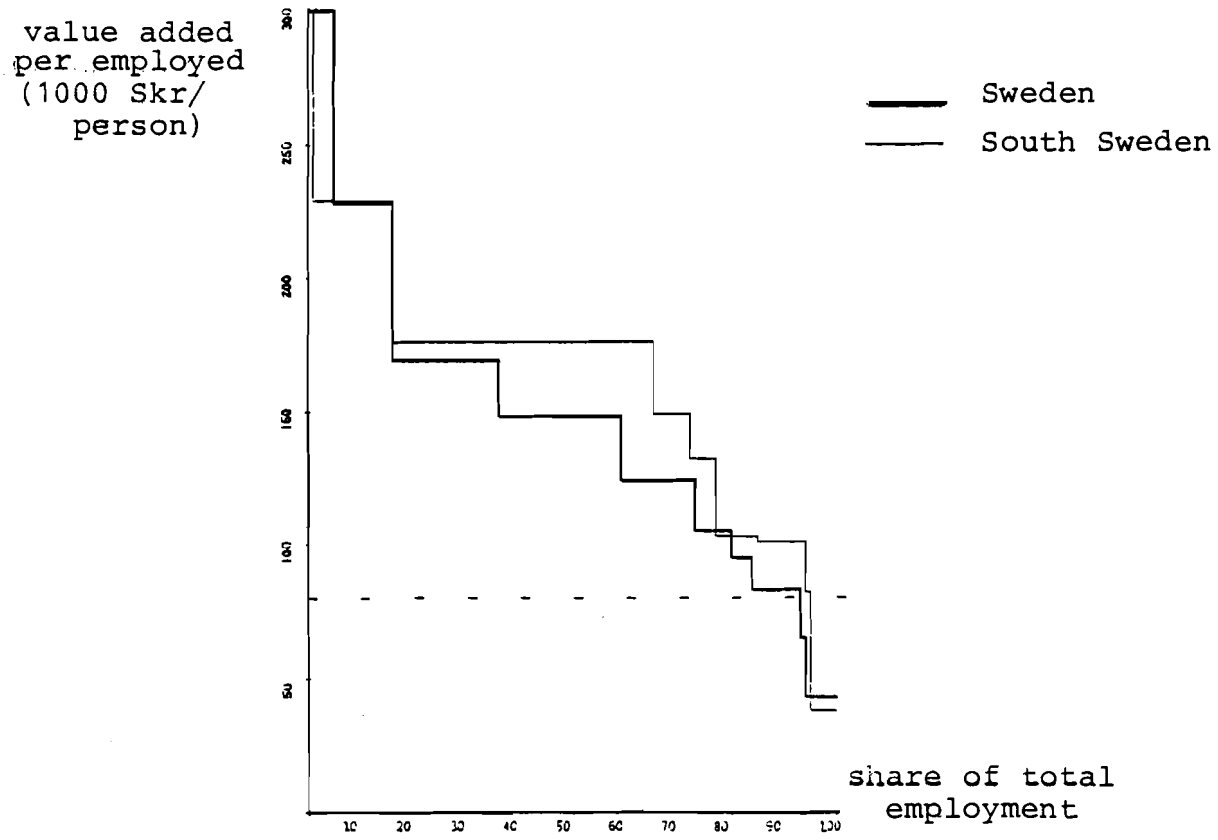


Figure 34. Demand curves for labor in chemical industry. Comparison between South Sweden and Sweden in 1977.

Skane's chemical industry belongs to the set of sectors which has the lowest labor cost electricity. This means that the chemical industry has an inelastic labor demand, which may primarily be coupled with the relatively hight capital intensity of the sector. The same conditions hold in the mining, and the paper and pulp industries.

The demand functions for labor shown in Figure 35 reveal that a 10 percent change in real labor cost will only give rise to a one percent change in labor demand. As a comparison, the plastic industry has a three times higher labor cost elasticity. The rubber industry exhibits a labor cost elasticity which is the double of the plastic industry one. These comments indicate that there is a considerable dispersion in the reaction patterns to labor cost changes in the various subsectors of chemical industry in Skane.

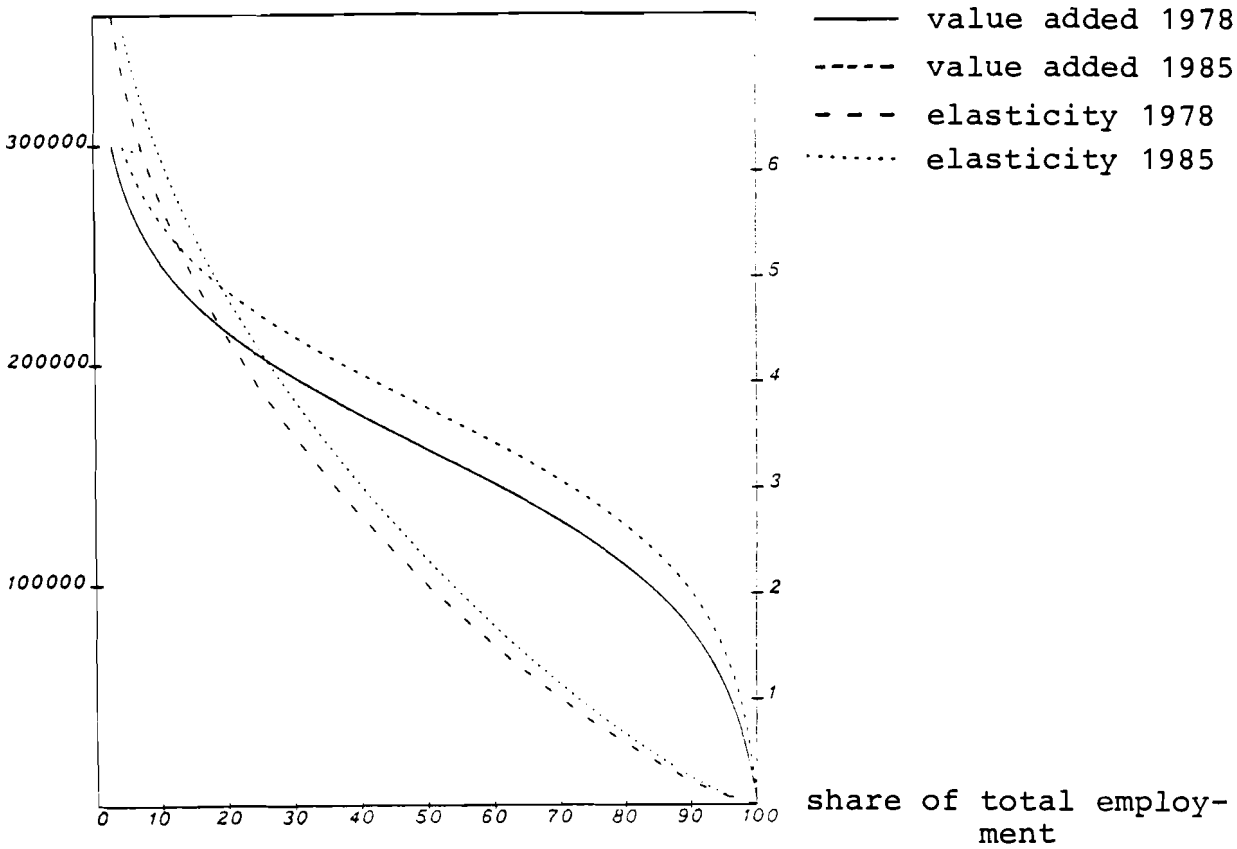


Figure 35. Continuous demand and elasticity functions for Skane's chemcial industry, 1968-1978 (1975 prices).

In Figure 34 the 1975 Skane demand curve for labor in the chemical industry is compared to the corresponding national curve. The figure shows that the major part of the chemical industry in Skane has a higher productivity or a better wage-pay capacity than the national average of the sector. It also shows that the least productive part of the chemical industry in Skane, which accounts for 20 percent of the employment of the sector, has a considerably lower productivity than the other parts. In the long run it is this low-profitability section that must be subjected to restructuring and that will affect the employment, land demand and location of the sector.

The demand curve for labor in the Skane rubber industry given in Figure 36 forms a completely different pattern. Almost 90 percent of the labor force belong to units having a very low wage-pay capacity. Minimal cost increases would almost completely do away with the labor demand of this subsector. Employment would then, in the short run, be dependent on subsidies for the covering of deficits.

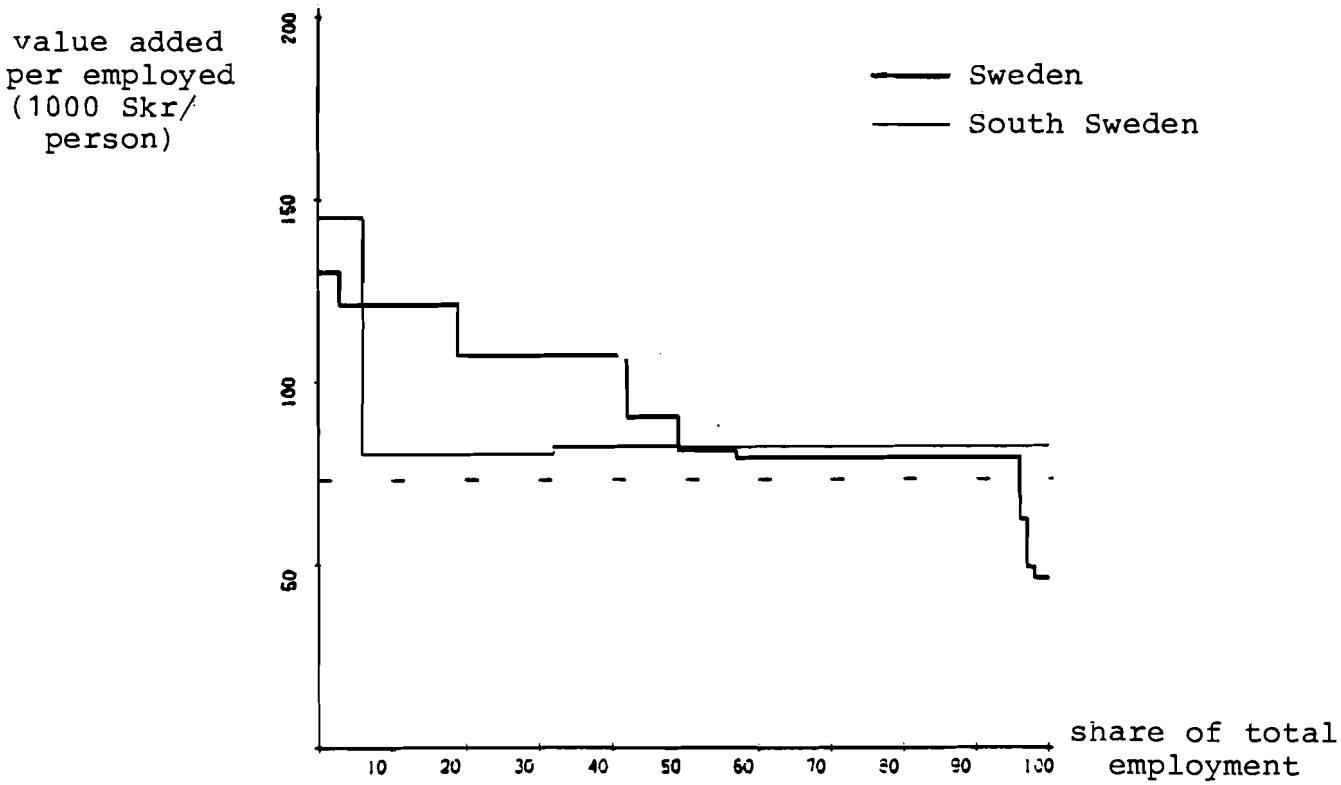


Figure 36. Demand curves for labor in the rubber industry. Comparison between South Sweden and Sweden in 1977.

4.8. Best-Practice Plants and Their Efficiency Profiles

To determine the characteristics of newly started or restructured units within the chemical sector, we have studied so-called best-practice plants.

Two types of best-practice plants have been investigated. In both cases the starting point has been the most profitable or productive units of the respective sector. The first type consists of units which make up the productivity-wise "top ten" of the respective sector. This means that we have selected the units which compose the first decentile of the demand curve, in short the decentile technology. Table 34 summarizes the decentile technologies of the chemical industry. The values refer to 1978 and are based on the national situation.

Table 34. Efficiency profiles of decentile efficient units in the chemical industry (1975 prices).

Subsector	Value added (Skr per employee)	Oil use (m^3 per employee)	Electricity use (MWh per employee)	Investment cost (Skr per employee)	Sales (Skr per employee)
Chemical proper	320,000	18.4	603	1,020,000	653,000
Rubber proper	114,000	6.6	23	274,000	207,000
Plastic proper	168,000	2.0	25	402,000	276,000

SOURCE: Computations from the data base of the Swedish Industrial Board.

The table clearly demonstrates the specific structure of the chemical industry proper compared to the rubber or plastic industries. The investment cost per work-place in the former sector is 2.5 to 5 times higher than in the latter ones. The table also shows the high energy dependency of the chemical industry.

A modernization of 20 percent of the chemical industry work-places through the best-practice technology referred to above would raise the electricity demand of the sector to 1,600 GWh compared to 580 GWh in 1979.

If we consider instead the efficiency profile of the productivity-wise "top four" of the chemical industry we obtain the following values, Table 35.

Table 35. Profiles of quartile efficient units in the chemical industry (1975 prices).

Subsector	Value added (Skr per employee)	Oil use (m^3 per employee)	Electricity use (MWh per employee)	Investment cost (Skr per employee)	Sales (Skr per employee)
Chemical proper	240,000	20.6	351	770,000	535,000
Rubber proper	110,000	10.0	25	265,000	191,000
Plastic proper	137,000	1.7	23	330,000	222,000

SOURCE: Computations from the data base of the Swedish Industrial Board.

Investing in quartile technology, as compared to investing in decentile technology, primary means "productivity losses" in the chemical industry. Quartile technology is also to a higher degree dependent on oil, while decentile technology is much more electricity intensive.

4.9. Summary of Basic Facts

- Skane has a well developed chemical sector, but in spite of this the development during the seventies has been remarkably anemic and negative.
- This fact must be related to the fast development of the chemical sector in most of the industrialized nations in Western Europe.
- The chemical industry is concentrated to the northwest and the southwest of Skane and its total land use amounts to slightly more than 1,000 hectares.
- The short-term problem is predominatnly the relatively big and low-productive rubber industry.
- In the long run 7,000 of the existing work-places will have to be subjected to restructuring.

- Something like 25 to 30 hectares of land ought to be reserved yearly for the needs of the chemical industry.
- Restructuring of the chemical industry can be expected to increase the total energy use of the sector.
- The chemical industry in Skane has a more favorable profitability and cost structure than in the rest of the country. The opposite goes for rubber industry.
- The relatively high capital intensity of the sector explains the rather inelastic labor demand. The fast productivity growth also implies that a substantial production increase is necessary to affect the labor market noticeably and positively.

5. EQUIPMENT INDUSTRY IN SKANE

5.1. Position in the World Market

The post-war development in Swedish industry is above all characterized by a substantial and fast growing equipment industry. Only the USA, among the developed industrialized nations, has since 1975 had a larger share of equipment industry than Sweden.

In the Swedish industry as a whole the equipment industry in 1979 accounted for 43 percent of the total value added. In Skane the corresponding value in the same year was 31 percent only. Skane, then, by comparison possesses a poorly developed equipment industry, the main reason of which is the undeveloped electrical industry. The composition of the equipment industry in Skane in 1979 is indicated in Table 36.

In reviewing the composition of the equipment industry in Skane it must be taken into consideration that the electrical industry since the middle of 1965 has grown by more than 9 percent per year in the world market. The corresponding growth in the developed market economies has been slightly more than 6 percent per year. The electrical industry has, along with the

Table 36. Equipment industry composition in Skane 1979.

Subsector	Employment	Share	Share of national total
Metal goods industry	8,200	23%	11%
Machinery industry	12,000	33%	10%
Electrical industry	2,500	7%	3%
Vehicle industry	11,600	32%	10%
Tool industry	1,900	5%	19%
Equipment industry total	36,200	100%	

SOURCE: SCB SM I 1981:9.

chemical industry, constituted the fastest growing market potential for the developed industrialized nations.

In the nearest neighbor countries of Skane--Denmark and the Federal Republic of Germany--the electrical industry also has been one of the most dynamic industrial sectors since the middle of the 1960s with a steady production growth amounting to about 7 percent annually. We do observe, then, a rapidly growing electrical industry in the neighboring countries, which has not, however, left any clear traces in the industrial structure of Skane.

5.2. Production and Employment

At the end of the 1970s the Skane equipment industry encompassed 480 production units. The average number of employees per unit was 75. During the seventies around 60 production units, or 10 percent, were closed down. The corresponding figure for the Skane food industry was slightly over 20 percent.

The development of the employment, however, was markedly positive for equipment industry until 1976. Between then and 1980 4,000 jobs have been eliminated.

Table 33. Production and employment in Skane's equipment industry.

	1973	1974	1975	1976	1977	1978	1979
Number of production units	537	539	542	540	529	500	481
Sales (current prices, mill.Skr)	4,590	5,980	6,800	7,470	8,010	8,040	8,880
Value added (current prices)	2,370	2,980	3,480	3,920	4,240	4,330	4,650
Value added (1975 prices)	3,110	3,275	3,480	3,430	3,880	3,280	3,410
Employment (persons)	36,147	37,893	39,050	40,277	38,839	36,927	36,242

As in other parts of the country the equipment industry in Skane has suffered from slow production growth in the 1970s. Between 1968 and 1978 the machinery and metal goods industry had a relatively low productivity growth, while the transportation industry (shipyards excluded) had a favorable productivity growth.

Production units with a productivity lower than the labor cost per employee (social fees included) cannot cover their labor costs with the achieved value added. To put it in another way: the operation of such units brings about losses even before the fixed costs have been included in the profitability analysis. Such a loss may be termed a gross deficit. During the late seventies 50,000 work-places in the Swedish equipment industry were at units entailing losses of the abovementioned kind. Shipbuilding industry excluded, the corresponding figure for Skane was 1,700. Accordingly, the losing share of the region is relatively low in those sections of the equipment industry which do not include shipbuilding. The latter included, the losing share of the Skane equipment industry increases to almost one fifth, or 6,400 employees. In this way we locate half of the losing-unit-employment to the shipbuilding industry.

In the long run also the production of equipment industry units must allow for the covering of fixed capital costs. Almost 130 work-places in the equipment industry in Skane do not meet with this requirement. Employment at these units has concerned 10,000 to 12,000 persons during the end of the 1970s. Consequently, half of the existing work-places need to be restructured within the next 5 to 15 years.

5.3. The Integration with the Regional Production System

Equipment industry has a strategic position in the industry and in the entire economy of all developed industrialized regions. It is not only a dominant supplier of products for export. Equipment industry is also a main deliverer of equipment for capital formation in industry, trade and in the energy sectors. Hence, the products of the equipment industry are significant "carriers" of technological development and productivity growth within major parts of the economy. A typical example of this is the tool industry and those branches of it which produce processing equipment. The integration of the equipment industry into the Skane economy is consequently a matter of strategic importance for the technical development. According to an inter-regional input/output table almost one fifth of the supply of equipment industry products of Skane was reserved from the intra-regional economy. Two sectors completely dominate the internal Skane sales market for equipment industry products. Slightly more than one third is accounted for by the equipment industry itself and slightly more than the half is accounted for by final use within Skane, i.e., private and public consumption and capital formation. In other words, the internal dependencies between different parts of the equipment industry in Skane constitute the most important links. We therefore want to elucidate these linkages on the basis of the composition of the equipment industry in Skane in 1979 (Table 38).

Table 38. The integration of subsectors of the equipment industry with the Skane economy. Rank order along subsector size 1979.

Subsector	Employment 1979		Degree of industrial integration 1st rank	2nd rank	3rd rank
Shipyards	7,792	22%	Shipyards	Machinery	Metal goods
Other machinery industry	6,808	19%	Machinery	Metal goods	
Other metal goods industry	4,783	13%	Metal goods	Machinery	
Manufacture of processing equipm.	3,159	9%	Machinery	Metal goods	
Metal constructs	2,570	7%	Metal	Machinery	
Car industry	2,400		Car	Metal	Machinery
Tool industry	2,079	6%	Tool	Electric.	Machinery
Other electrical industry	1,395	4%	Electric.	Machinery	Metal
Machinery for wood and metal manuf.	825	2%	Machinery	Metal goods	
Rail vehicle ind.	724	2%	Machinery	Metal goods	Shipyards
Computers and office machinery	685	2%	Electric.	Machinery	
Telephone, telegraph products	572	2%	Telephone telegraph	Electric.	

SOURCE: SCB, SM, N 1980:3 appendix and I 1981:9.

The main impression given by the above list is the relatively poor integration of the shipbuilding industry with other parts of the equipment industry. It contributes as an important sub-contractor only within its own field and within the rail vehicle industry.

On the other hand the shipbuilding industry constitutes one of the most important markets for both the machinery and the metal goods industries. As a supplier to these sectors, however, the role of the shipyards is very subordinate.

5.4. Location Patterns and Land Use

As seen in Figure 37, the equipment industry in Skane is concentrated in five regions. Malmö, Lund, Landskrona, Helsingborg and Hässleholm. Together these regions account for almost 75 percent of the sectoral employment.

We also observe a concentration to the Öresund region. Almost half of the equipment industry is further located to southwest Skane, which during the late seventies had slightly more than 17,000 work-places within the sector.

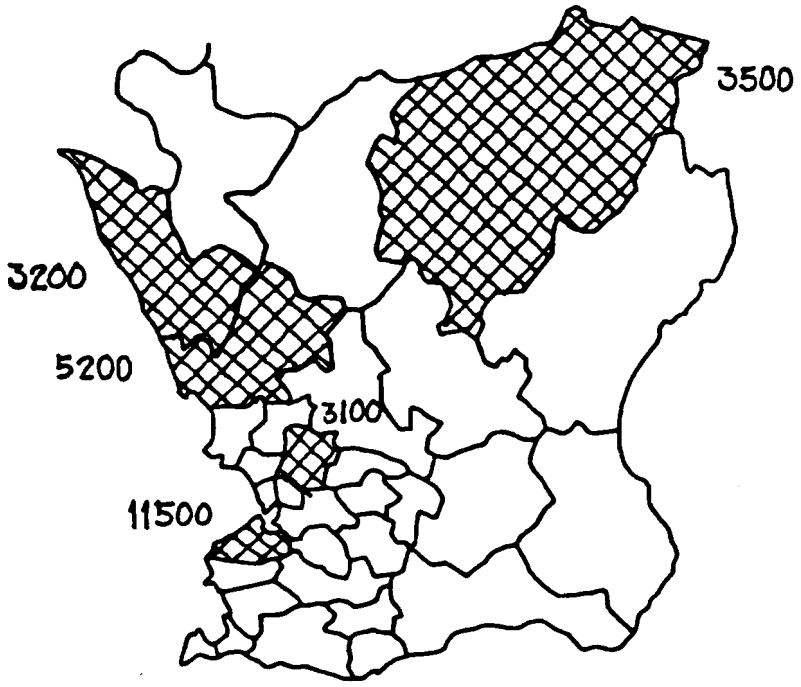


Figure 37. Main concentrations of the equipment industry in Skane during the late 1970s.

Numerous studies have shown that the equipment industry has a relatively high work-place density per land unit. This intensive land use can primarily be explained by the fact that the major part of the sector has a relatively low capital intensity; in other words, the fixed capital per employee is clearly below the industry average. On the basis of different sources we have estimated the average work-place density of the Skane equipment

industry to be slightly more than 100 employees per hectare. Proceeding on this assumption the total land use of the equipment industry in Skane in the middle of the seventies amounts to about 400 hectares. In other words, it would be the equivalent of the cultivated land of about 20 normal Skane farms. As a comparison the equipment industry land use in the Stockholm region at the same time totalled not quite 700 hectares. According to the same norm the land use of the equipment industry in southwest Skane is almost 180 hectares. This figure equals slightly more than one-eighth of the real estate area utilized for multi-family houses in the same region.

Earlier we expressed the land use per employee as: (land/employee) = (land/capital) x (capital/employee). Assuming an unchanged degree of exploitation in the equipment industry land use--i.e., the ratio (land/capital) is constant--the land use per employee becomes a question of the development of the capital intensity. If one further assumes that an increase in capital intensity will have a full "impact" on the industrial restructuring process the land use in the long run will follow the growth of the capital intensity. Between 1963 and 1979 the capital intensity in the Swedish equipment industry increased by an annual average of 7.5 percent. Assuming a long-term constant employment in the Skane equipment industry, the following examples of future land demand may be given, made on the basis of the above assumptions:

- Restructuring of 18,000 work-places corresponds to a gross demand for 400 to 500 hectares in the 1980s and the 1990s.
- The land made free by exists and restructuring amounts to 200 hectares.
- The resulting net demand for 200-300 hectares would, during the rest of the century, means an annual increase of 10 to 15 hectares, or 1.5 to 2 percent.

5.5. Transport Costs and Energy Use

Transport of equipment industry products is characterized by high reloading and terminal costs. The distance sensitivity, however, is low. This means that the transport costs are above those of other sectors for short distances and below for long distances. In a comparison between equipment industry products on one hand and food and chemical products on the other, the critical limit turns out to be around 250 kilometers. Figure 38 compares the transport cost structure of equipment industry products to that of chemical products.

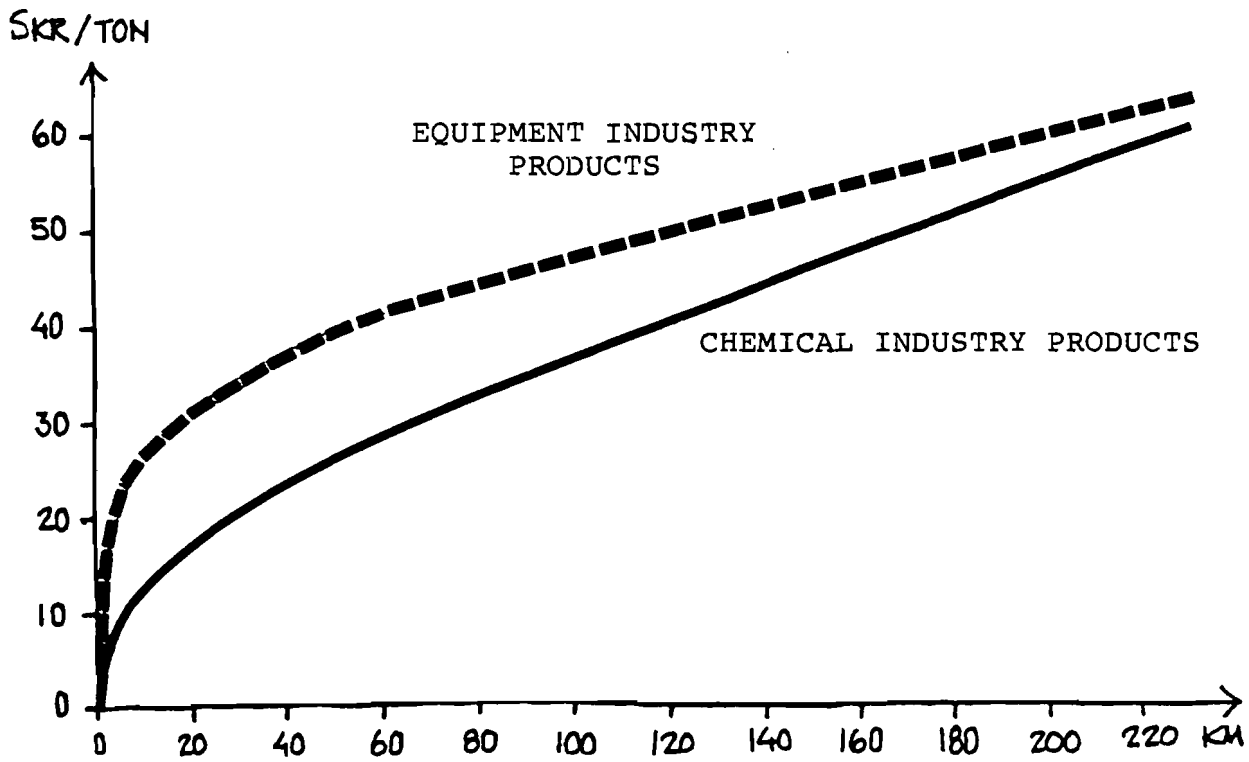


Figure 38. Transport cost curves for equipment industry products. Transport costs per ton of equipment industry products, d = road distance in km.

The equipment industry is further characterized by a low energy intensity. This goes for the use of both electricity and liquid fuels. At the end of the 1970s the energy use was distributed between the subsectors as depicted in Table 39.

Table 39. Energy use in the equipment industry in Skane 1978.

	Electricity (GWh)	Liquid Fuels (m^3)
Metal goods industry	76	18,000
Machinery industry	98	25,000
Electrical industry	30	4,000
Transportation industry	37	9,000
Shipyards	100	18,000
Total	341	74,000

The least electricity intensive industry of Skane uses in the average 2 MWh per employed person and the most electricity intensive one 40 MWh per employed person and year. Equipment industry with higher productivity than the Skane average also involves more electricity intensive production processes than units with a low productivity.

The equipment industry with the highest dependency on liquid fuels consumes 5 cubic meters per employed person and year and the units with the lowest dependency some 0.8 cubic meters per employed person and year only. The use of liquid fuels is not linked to the productivity in the Skane equipment industry. Restructuring would consequently increase the electricity demand in the first place.

5.6. Cost and Supply Structures

The cost structure of the equipment industry can be described in terms of so-called supply curves, in which the work-places have been ordered according to increasing costs in percentage of the value added. In the following we will report on the development of the supply structure of the Skane equipment industry from 1968 to 1978. The units of the sector have been divided up according to size. Units with less than 200 employees are labelled "small plants" and units with more than 200 employees "large plants".

Figure 39 shows that the smaller units have undergone minimal changes in profitability structure during the ten-year period. The production in losing units has increased slightly but for the rest the cost patterns coincide to a high degree. Turning to the larger units, however, we even observe an improvement in the center of the curve (Figure 40).

5.7. Productivity and Labor Demand

In conclusion we want to summarize the entire productivity structure of the Skane equipment industry. As before, productivity is measured as value added per employee.

Figures 41, 42 and 43 sum up the demand structure for labor in the Skane metal goods, machinery and electrical industries. The metal goods structure implies by and large a higher productivity or wage-pay capacity than in other parts of the country. The same sector turns out to have--in the late seventies--a minimal share of the employment in losing units.

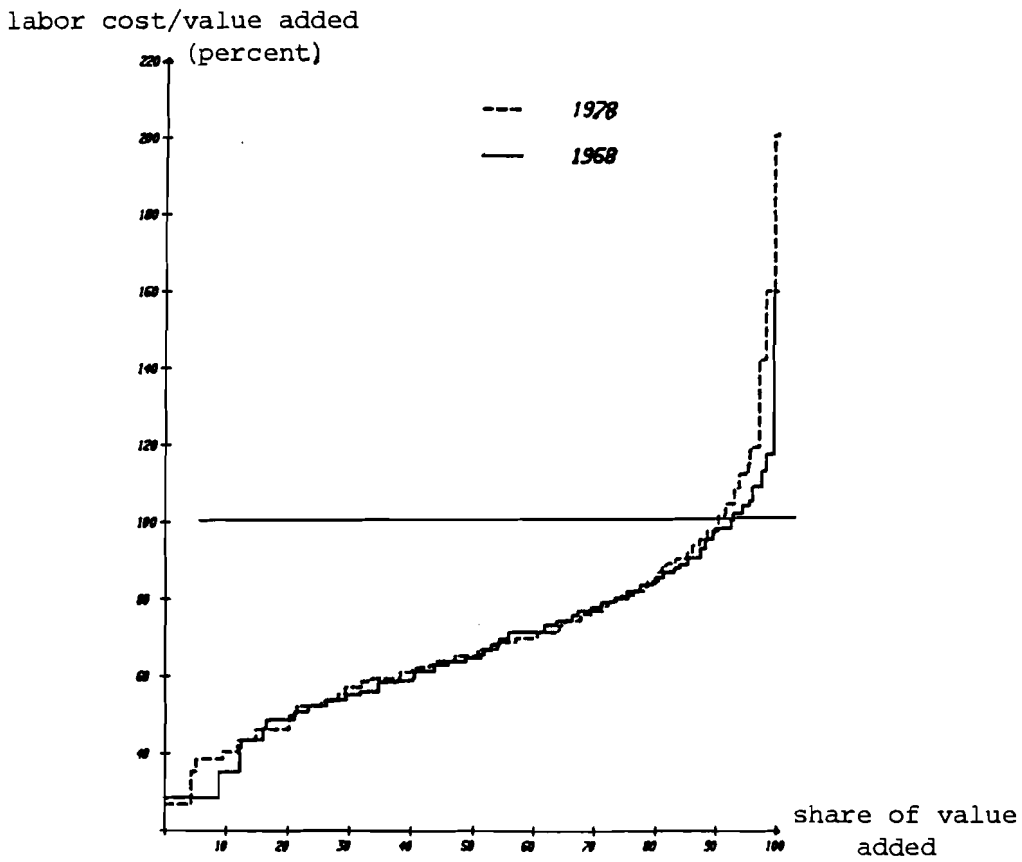


Figure 39. Supply function for small units in the equipment industry in South Sweden 1968 and 1978.

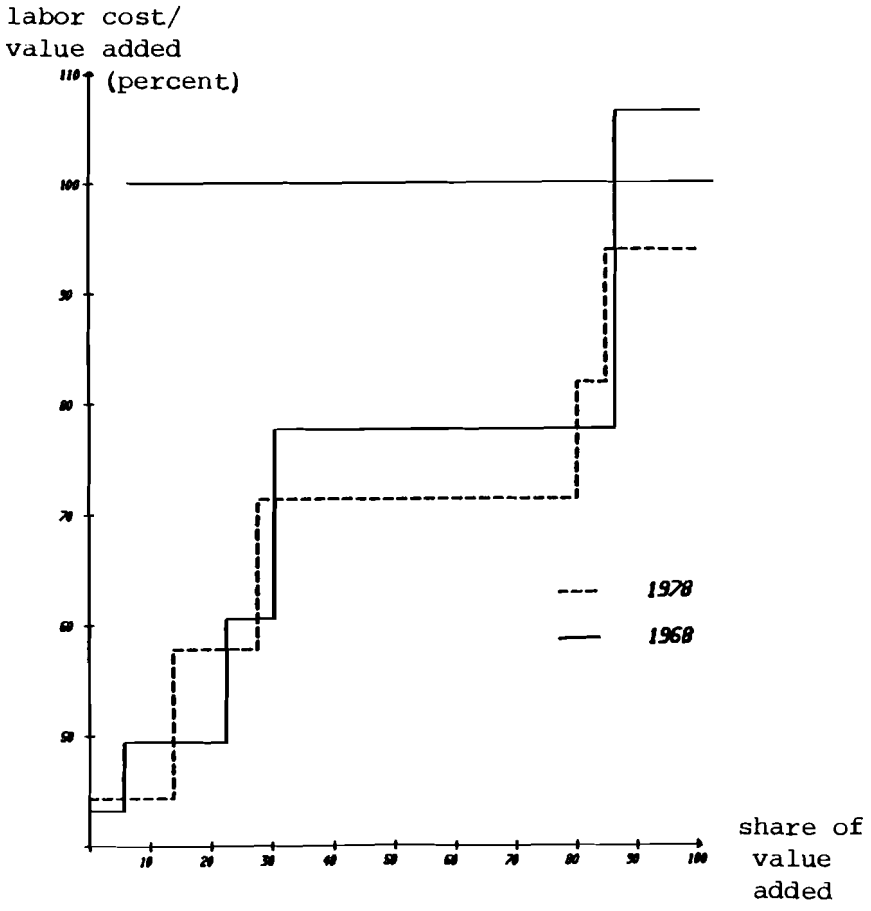


Figure 40. Supply function for large units in the equipment industry in South Sweden, 1968 and 1978.

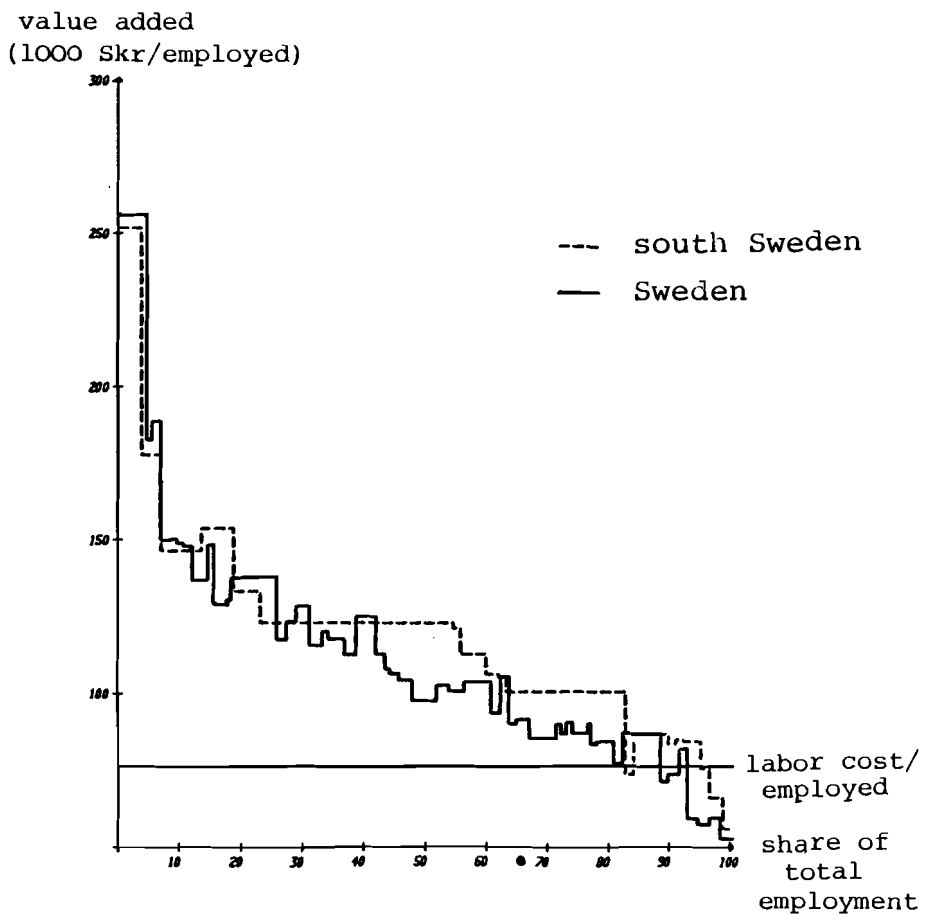


Figure 41. Demand function for the Skane metal industry compared to the national average in 1978.

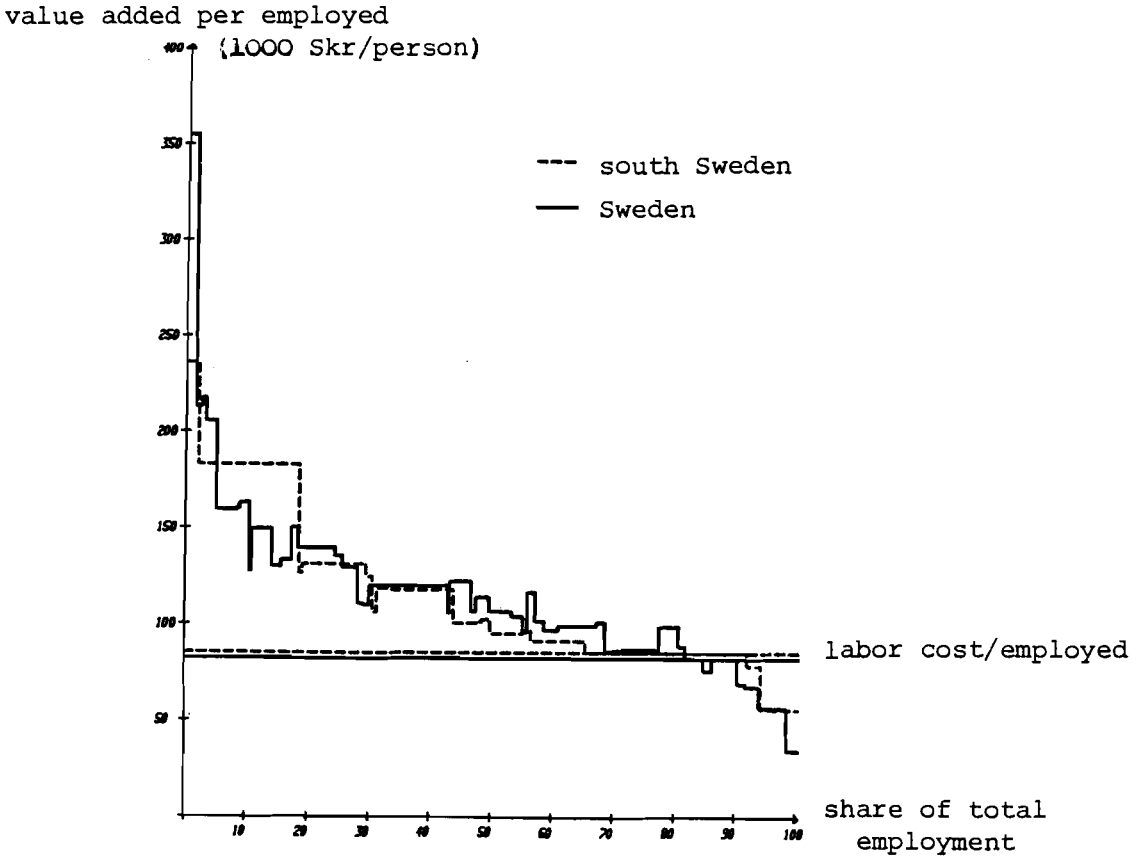


Figure 42. Demand function for the Skane machinery industry compared to the national average in 1978.

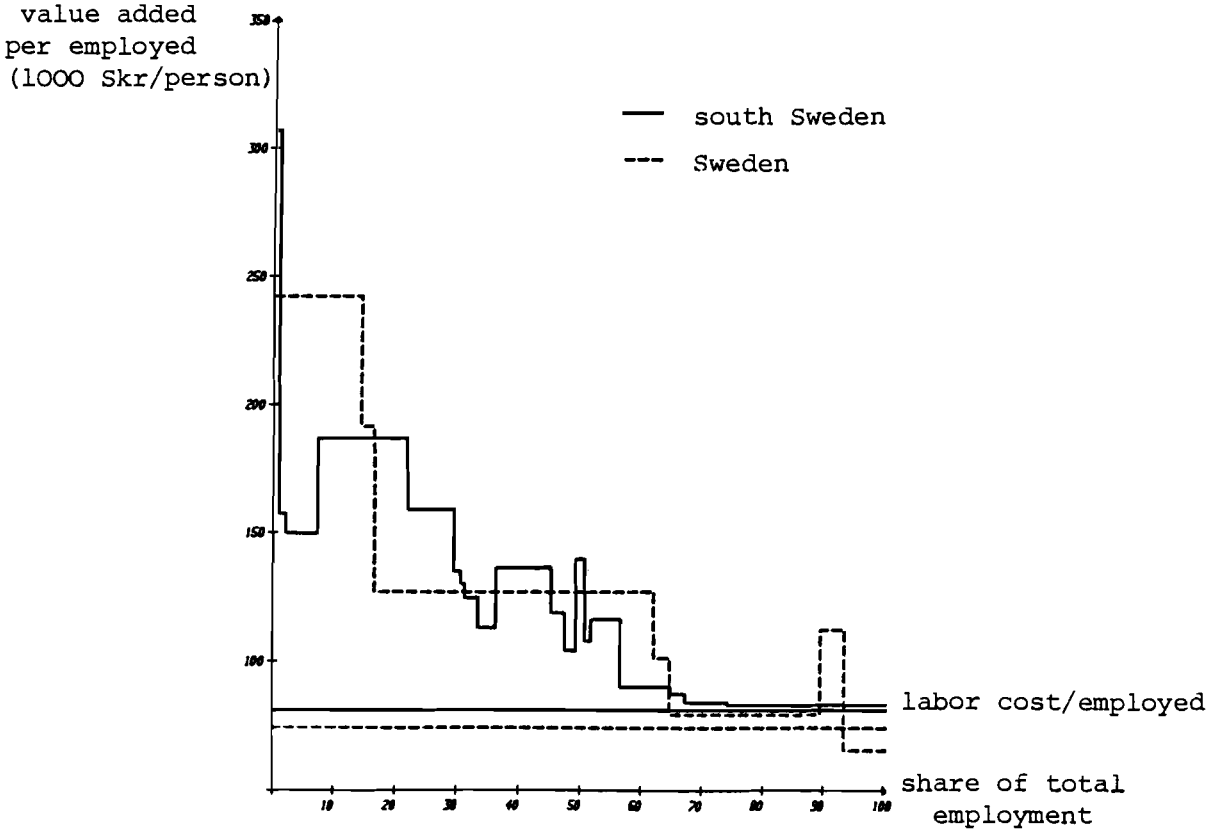


Figure 43. Demand function for the Skane electrical industry compared to the national average in 1978.

The Skane machinery industry is differently structured. More than half of the units in the sector have a lower productivity in Skane than in the rest of the country. Much more serious for SKane is the fact that almost 30 percent of the sectoral employment pertains to production units whose productivity is just about level with the current labor cost. When these untis have covered their labor costs, nothing remains whatsoever for covering of fixed costs or for repairs and maintenance.

In the case of the electrical industry it is clearly demonstrated that Skane has more or less the same structural problems as the rest of Sweden. Around 30 percent of the employment pertains to very low-productive units.

Demand curves of the kind shown in Figures 41-43 allow us to study the development of productivity in a more systematic way. Two characteristics are in this context particularly significant: (i) the temporal change of the demand curve; and (ii) its shape. The shift of the demand curve indicates the productivity growth or changed wage-pay capacity of the sector. The shape of the curve indicates the sensitivity of the sector to labor cost changes. A "flat" demand curve in the wage intervals under consideration indicates that the labor demand is sensitive to labor cost changes. A "steep" curve indicates that the sector labor demand is insensitive to real-term pay changes. As we have already pointed out, the "steep" curve further demonstrates that changes of the domestic level of wages and salaries, as compared to the world market prices of the sector, will cause weak demand effects on the labor market.

On these grounds we can characterize the Skane equipment industry in the following way:

- In Skane the machinery industry labor demand is the most sensitive one to the cost of labor. The labor cost elasticity of this sector in Skane is well above the national sector average.

- The labor cost elasticity of the remaining parts of the Skane equipment industry is below the industry average and below the national average of the respective sector.

Changes in industrial cost structure during the eighties can be expected then to influence the labor demand of the machinery sector first of all. Figures 44, 45 and 46 spell these conclusions out in terms of statistically verified demand curves for labor in the equipment sector in Skane.

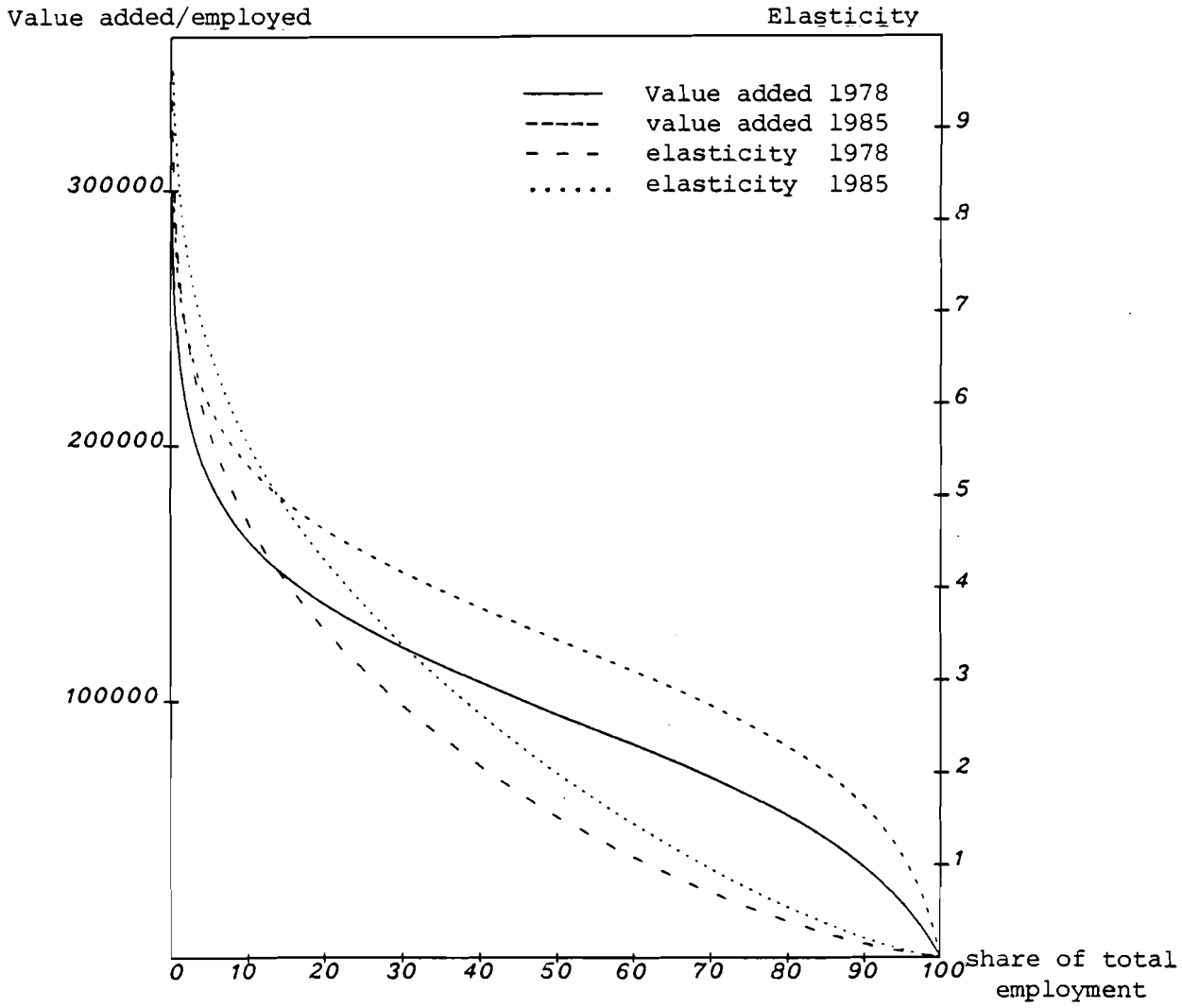


Figure 44. Continuous demand and elasticity functions for Skane's machinery industry 1968-1978 (1975 prices).

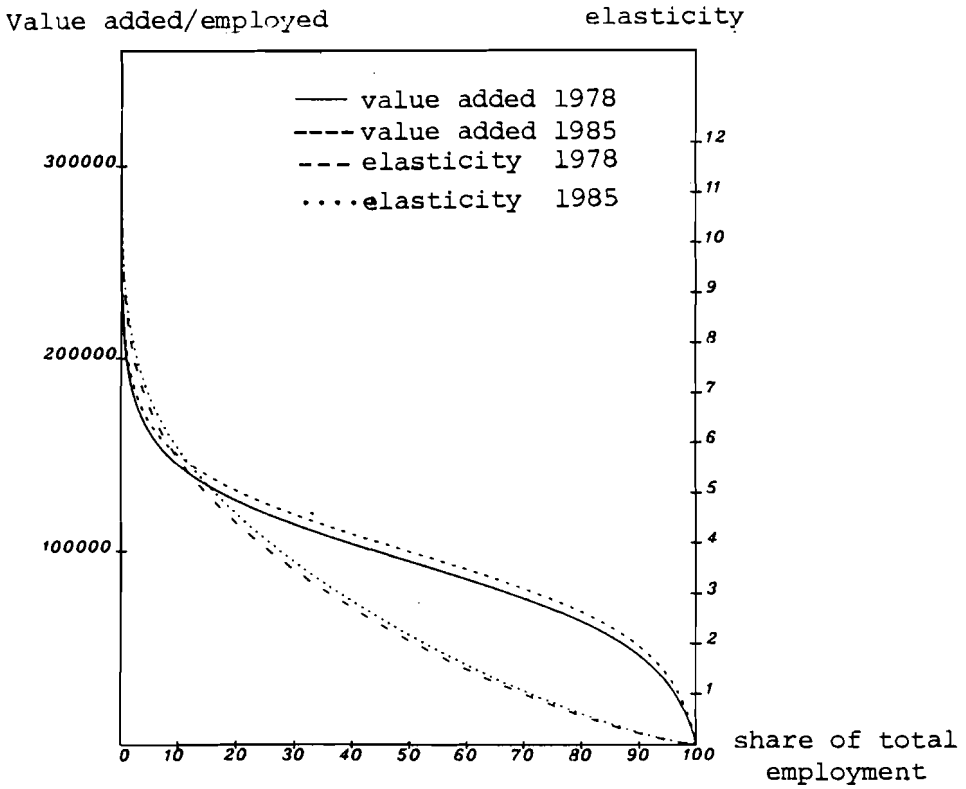


Figure 45. Continuous demand and elasticity functions for Skane's metal goods industry, 1968-1978 (1975 prices).

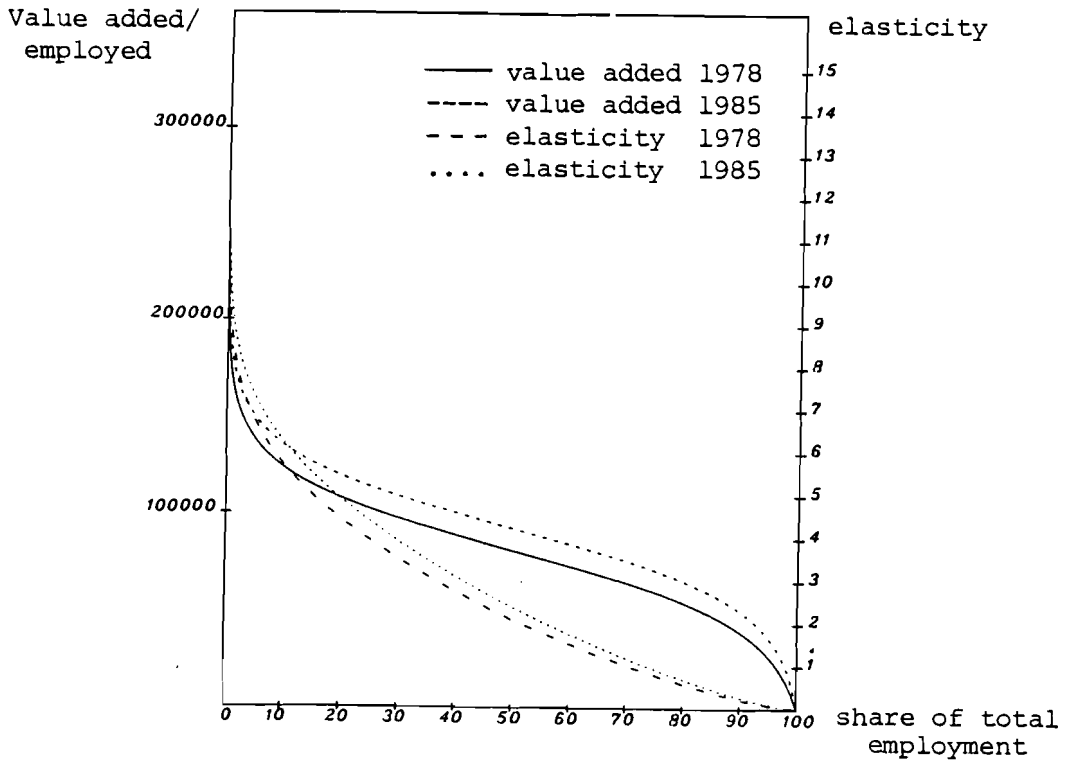


Figure 46. Continuous demand and elasticity functions for Skane's machinery industry 1968-1978 (1975 prices).

5.8. Best-Practice Plants and Their Efficiency Profiles

To determine the characteristics of newly established equipment industry we have specifically investigated the production structure of so-called best-practice units within the various subsectors. Two kinds of best-practice estimations have been performed concerning (i) quartile and (ii) decentile technologies. The first estimation concerns those units which compose the profitability- and productivity-wise best quarter of the sector. The decentile technology refers to the best tenth. The 1975 price structure has been used for the estimations. For the late seventies we arrived at the target values given in Table 40.

Table 40. Decentile technology for the equipment industry (1975 prices).

Industry	Value added (Skr per employee)	Oil use (m^3 per employee)	Electricity use (MWh per employee)	Investment cost (Skr per employee)	Sales (Skr per employee)
Metal goods	218,000	2.9	22	569,000	364,000
Machinery	190,000	1.7	10	493,000	295,000
Electrical	129,000	1.0	7	309,000	193,000
Vehicle	150,000	2.7	15	389,000	311,000
Equipment industry excl.shipyards	171,000	2.1	14	404,000	290,000

SOURCE: Computations from the data base of the Swedish Industrial Board.

For newly established or completely restuctured units of the Skane equipment industry we can count upon an average investment demand amounting to 400,000 Skr per work-place. Each such work-place increases the market value by 290,000 Skr per year. Its energy demand corresponds to 2.1 cubic meters of liquid fuels and 14 MWh of electricity. The value added per employee will be about 170,000 Skr. The latter value can be compared to the average for the Skane equipment industry in 1979, which was 93,000 Skr per employee in 1975 prices. Considering instead the so-called quartile technologies of the equipment industry we obtain efficiency profiles as shown in Table 41.

Table 41. Quartile technology for the equipment industry (1975 prices).

Industry	Value added (Skr per employee)	Oil use (m^3 per employee)	Electri-city use (MWh per employee)	Invest-ment cost (Skr per employee)	Sales (Skr per employee)
Metal goods	152,000	2.6	17	396,000	265,000
Machinery	146,000	1.5	9	381,000	252,000
Electrical	138,000	1.2	9	330,000	310,000
Vehicle	125,000	2.7	12	324,000	304,000
Equipment ind. excl.shipyards	140,000	2.0	12	357,000	282,000

SOURCE: Computations from the data base of the Swedish Industrial Board.

In this case the investment cost per work-place is almost 50,000 Skr lower, which reflects the lower capital intensity in this kind of plant. Compared to the productivity average of the Skane equipment sector the best-practice plants with quartile technology achieve a 50 percent higher productivity.

5.9. Summary of Basic Facts

- The electrical industry is the least developed equipment industry subsector in Skane.
- During the later part of the 1970s 4,000 work-places within the Skane equipment sector have been eliminated.
- During the 1970s 10 percent of the equipment industry production units in Skane have been shut down.
- The shipbuilding industry is an important user of products from the metal goods and machinery industry. Otherwise it is a poorly integrated part of the equipment industry.
- In the late seventies 1,500 to 2,000 persons have been employed at units acutely threatened by close-down, shipyards excluded.
- Half of the sector is not able to cover the capital costs in a way which is satisfactory in the long run.

- Provided that the restructuring pace is normal and the employment level constant, the net demand for land in Skane will increase by 10 to 20 hectares annually.
- For completely restructured equipment industry units one can expect investment costs amounting to 350,000 to 400,000 Skr per employee (1975 prices).
- The small plants equipment industry in Skane has, by and large, preserved its cost and profitability structure since the late sixties.
- The Skane shipyards are threatened by an immediate shut-down if they cannot diversify their production.

6. OTHER INDUSTRY IN SKANE

6.1. Position in the World Market

Apart from the major sectors, food industry, chemical industry, and equipment industry, we find in Skane a large group of sectors which are summed up as "other industry" in this section of the paper. This heterogenous group (see Table 42) consists of seven sectors with a total of slightly more than 32,000 employees towards the end of the 1970s. Two of these sectors are well developed in Skane--the graphic industry and the stone, clay and cement industry. Of the national employment of these sectors, about one fifth is allocated to Skane.

Table 42. The composition of the sector "other industry" in Skane.

Industry	Employment	Percentage share	Share of national total (percent)
Graphic	7,400	23	17
Stone and clay	6,700	21	23
Wood products	6,500	20	9
Textile	5,400	17	13
Pulp and paper	5,000	15	8
Iron and steel	800	2	1
Mining	500	2	4
Total	32,300	100	

SOURCE: SCB, I 1981:9.

Compared to the world market growth between 1965 and 1978 all seven sectors are characterized by slower growth than the average of the industry. This applies for all of Sweden, see Table 43).

Table 43. Production growth in other industry in different markets. Percent per year.

Sector	World 1965-1978	EC 1965-1978	Sweden 1967-1978
Textile	3.8	1.5	0.8
Wood products	4.4	4.1	3.3
Pulp and paper	4.2	2.8	2.8
Graphical	3.6	3.0	1.2
Stone and clay	5.4	2.9	1.0
Iron and steel	3.8	1.5	2.1

The poor development of the Swedish graphical industry and the stone, clay and cement industry must be underlined since both sectors are important to Skane. The entire "other industry" sector of Skane belongs then to a market section, which grows slowly both nationally and internationally.

6.2. Production and Employment

130 units belonging to "other industry" in Skane were shut down during the seventies (Table 44). This process of discontinuation mainly concerned the textile industry (around 60 exits) and the wood industry (40 exits). 20 stone, clay and cement industry units have been closed down. At the end of the 1970s the "other industry" sector included slightly more than 560 independent work-places with more than 4 employees. The average employment per work-place was 57 persons.

As can be seen in Table 45, employment within the subsectors of "other industry" has been reduced by 5,000 persons during the seventies. Textile industry has accounted for 3,000, and stone, clay and cement industry for 1,500 of this decrease.

Table 44. Other industry. Development of the number of production units.

Industry	1973	1974	1975	1976	1977	1978	1979
Mining	28	27	29	28	29	28	27
Textile	158	158	153	137	131	115	105
Wood products	201	199	200	188	172	170	162
Pulp and paper	21	173	36	33	30	179	30
Graphical	152		152	149	149		146
Stone and clay	104	101	92	89	88	85	85
Iron and steel	16	16	14	11	10	9	9
Total	680	674	676	635	609	586	564

SOURCE: Industrial Statistics.

Table 45. Employment development in other industry in Skane.

Industry	1973	1974	1975	1976	1977	1978	1979
Mining	690	670	650	600	560	540	540
Textile	8430	8200	7880	7400	6670	6010	5400
Wood products	6270	6340	6650	6240	6180	6400	6470
Pulp paper and graphical	12120	12350	12540	12470	12070	12120	12360
Stone and clay	7900	7860	7770	7030	6790	6680	6680
Iron and steel	1060	1090	1040	1040	970	640	810
Total	36470	36510	36530	34780	33240	32590	32250

SOURCE: Industrial Statistics.

Table 46. Development of value added in other industry in Skane (1975 prices, million Skr).

Industry	1973	1974	1975	1976	1977	1978	1979
Textile	520	500	490	490	430	370	320
Wood products	540	510	610	610	630	670	670
Pulp, paper and graphical	1540	1470	1430	1470	1500	1640	1680
Stone and clay	730	720	670	600	520	560	580
Iron and steel	180	190	240	240	230	240	210
Total	3510	3390	3440	3410	3310	3480	3480

SOURCE: Computation from Industrial Statistics.

The Skane wood industry, on the other hand, has profited from a very stable development of employment. The same goes for graphic industry.

The total production volume--value added--of the "other industry" sector almost equals that of the equipment industry. In the seventies this mixed sector has had a stable production volume, which reflects that it belongs to a stagnating section of the market, see Table 46.

In the late seventies, sectors belonging to "other industry" have employed slightly more than 50,000 persons in losing units. In Skane, this industry which cannot cover its labor costs, employed 2,500 persons. The short-term demand for market exits within "other industry" in Skane thus concerns 8 percent of the employment. This threatened employment is distributed as follows: 1,000 in textile industry, 700 in pulp and paper industry and 500 in wood industry. In both the graphic, and the stone, clay and cement industries, the acute threats of discontinuation are minimal.

In the perspective of 5 to 15 years the production at "other industry" units must allow for the covering of fixed costs. For the stone, clay and cement industry, the pulp and paper industry, and the iron and steel industry the fixed costs amount to at least 30 percent; for the textile, wood and graphic industries, to 20 percent.

In addition to the acutely threatened parts of the "other industry" sector there are 7,000 jobs at 150 work-places in Skane, which do not generate sufficient surplus for the covering of such fixed costs. In terms of employment the total need of restructuring of "other industry" concerns 9,500 jobs.

6.3. Location Patterns and Land Use

The "other industry" sectors are concentrated on eight regions in Skane (see Figure 47). These regions have around

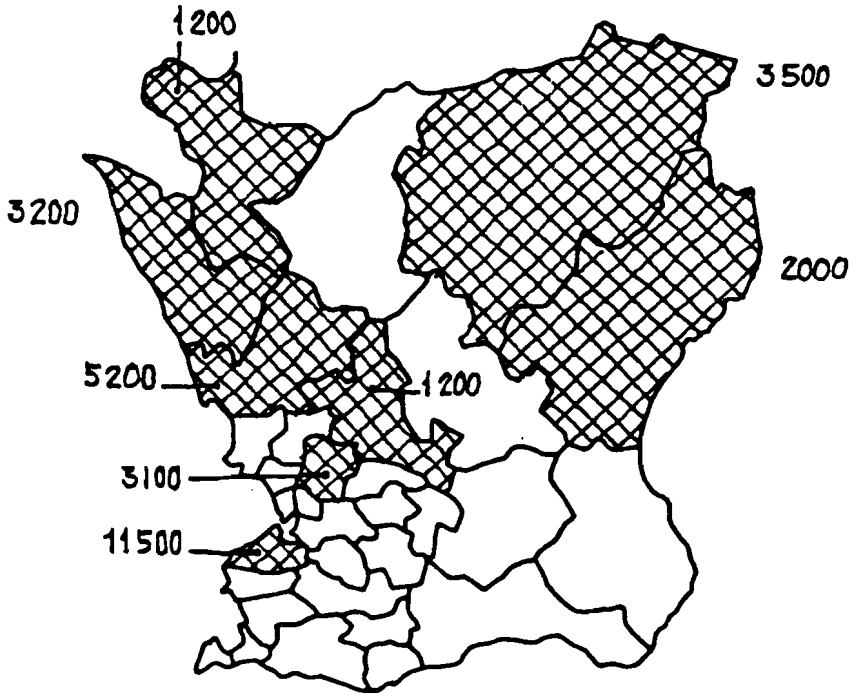


Figure 47. Main concentrations of other industry in Skane. Number of employees.

90 percent of the "other industry" employment. Number one is Malmö with almost 11,500 employees, number two is Landskrona with 5,200. Southwest Skane as a whole has slightly more than 50 percent of the work-places within "other industry". In absolute figures of employment the "other industry" sector equals the equipment industry in southwest Skane. In the central and southeast parts of Skane "other industry" is poorly developed.

For the mixed sector as a whole we have estimated the employment density to have been 30 employees per hectare in the middle of the seventies. It must be underlined that this is the average for a sector group with a very heterogenous land use intensity. The graphic industry on the one hand has a work-place density similar to that of the equipment industry, while the stone, clay and cement industry has a very extensive land use. The above work-place density disregards the Skane mining industry. To indicate the work-place density of this sector would be meaningless.

According to the figures given above, the total land use in Skane would not be quite 1,200 hectares for "other industry", 600 hectares being situated in southwest Skane.

The heterogenous character of this sector makes all calculations of future land demand substantially uncertain. The growth of capital intensity has varied historically within the sector. From 1963 to 1979 the capital intensity of the graphic industry increased by 3.5 percent annually, while the growth in the textile and wood industries amounted to slightly more than 7 percent per year and to slightly less than 7 percent in the stone, clay and cement industry. As a guiding figure for the future increase in capital intensity in "other industry" we choose 5 percent per year.

Let us assume an unchanged degree of exploitation and an unchanged employment volume in "other industry", as in the cases of the equipment, food and chemical industries. Then we may estimate the long-term land use consequences of restructuring investments:

- Reductions and discontinuations of production frees 300 hectares.
- Reinvestments and restructuring increases the land use by 500 hectares.
- The net increase in the land demand of "other industry" until the middle of the nineties amounts to 200 hectares, or 10 to 15 hectares per year.

6.4. Transport Costs and Energy Use

The transportation cost function of "other industry" is characterized by low terminal costs and high distance elasticity. A ten percent increase in transportation distance causes an increase in transportation cost per ton of almost 6 percent.

The products of "other industry" are also characterized by a low value per weight unit. The transportation cost per million

Skr sales value are therefore around five times higher than for equipment sector products. Figure 48 gives the transportation cost function of "other industry" in Skane.

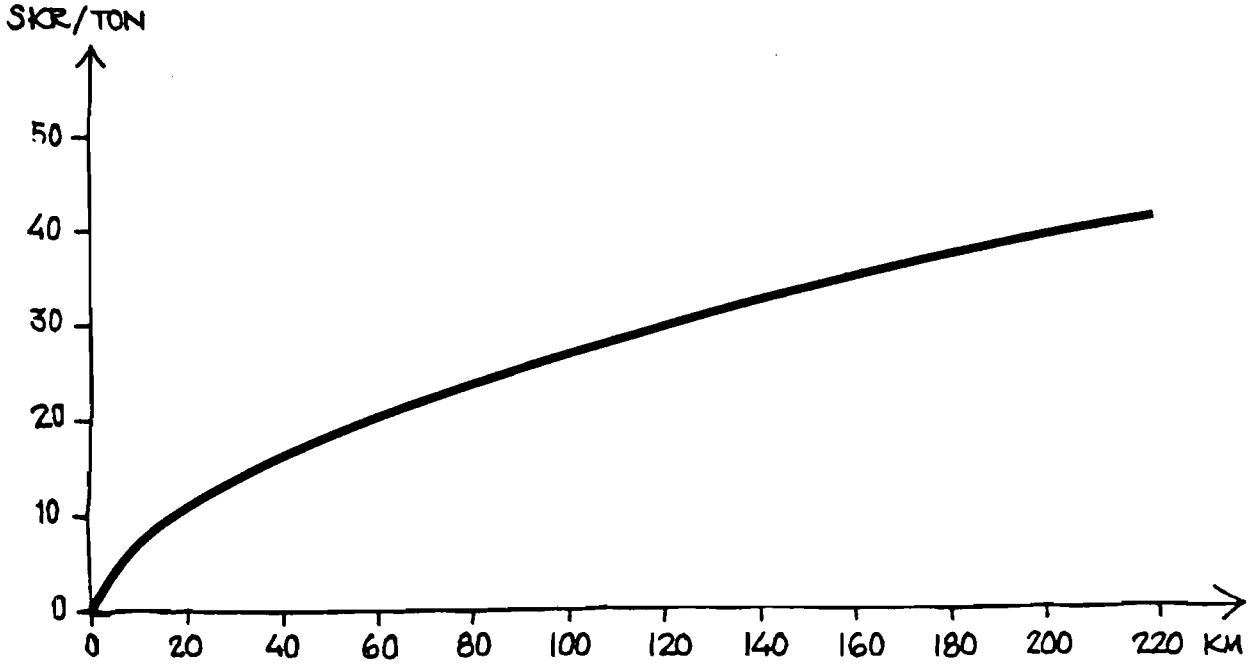


Figure 48. Transport cost function for other industry.
Estimated transport cost function =
Transport cost/ton = 1.79 $d^{0.59}$;
d = road distance in km;
F-value = 225.

From the point of view of energy use the "other industry" sector in Skane is heterogenous. The pulp and paper industry and the stone, clay and cement industry are markedly energy intensive. The rest of the sector has low energy intensities.

Table 47 shows that the electricity consumption of "other industry" amounts to almost 1 TWh per year.

The pulp and paper industry units which are the most electricity intensive ones within the "other industry" sector consume up to 190 MWh per year and employee. The most electricity intensive units of the stone, clay and cement industry consume 65 MWh per year and employee. In the least electricity intensive units

Table 47. Energy use in "other industry" in Skane.

Industry	Electricity use	Use of liquid fuels (m^3)
Textile	41	14,000
Wood products	95	14,000
Pulp and paper	405	41,000
Stone and clay	233	76,000
Iron and steel	80	24,000
Total	901	177,000

SOURCE: Computations from Industrial Statistics.

of the sector the consumption is less than 1 MWh per employee. The use of liquid fuels amounts to 25 cubic meters per employee in the units of the pulp and paper industry and the stone, clay and cement industry which rely most heavily on oil. The lowest consumption figure for liquid fuels is provided by the textile industry--0.3 cubic meters per employee.

6.5. Costs, Productivity and Labor Demand

For the Skane wood industry we note an improved cost pattern in 1978 as compared to 1968. The Skane profitability pattern of the sector has all through the seventies been better than the national sector average (see Figures 49 to 52). For the stone, clay and cement industry in Skane, the seventies have brought about a change in the cost and profitability pattern of the whole sector. The better units have deteriorated, the rest has improved. This sector has had a more favorable cost structure in Skane than in most other parts of the country all through the 1970s.

In conclusion, we have identified a more favorable production structure for the Skane "other industry" sector than in the corresponding national sectors. Once again it must be pointed out, though, that this aggregation of sectors as a whole is characterized by a growth below the industry average.

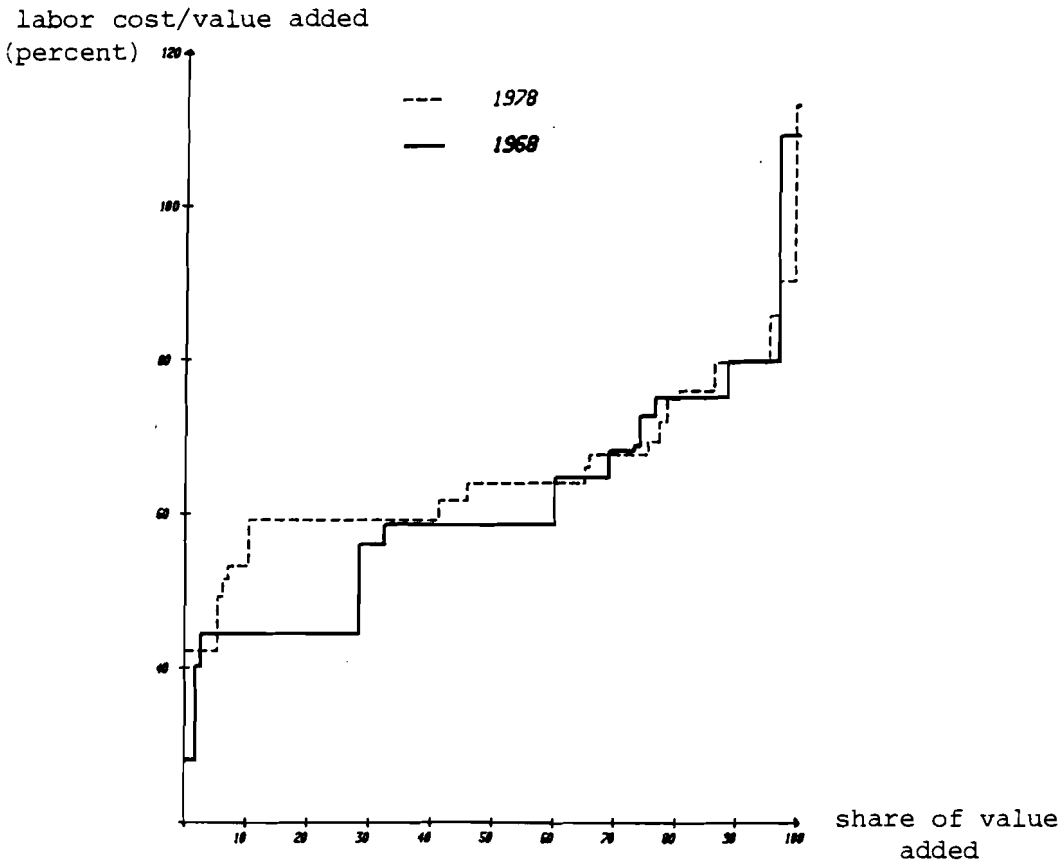


Figure 49. Supply function for textile industry in south Sweden. Development 1968-1978.

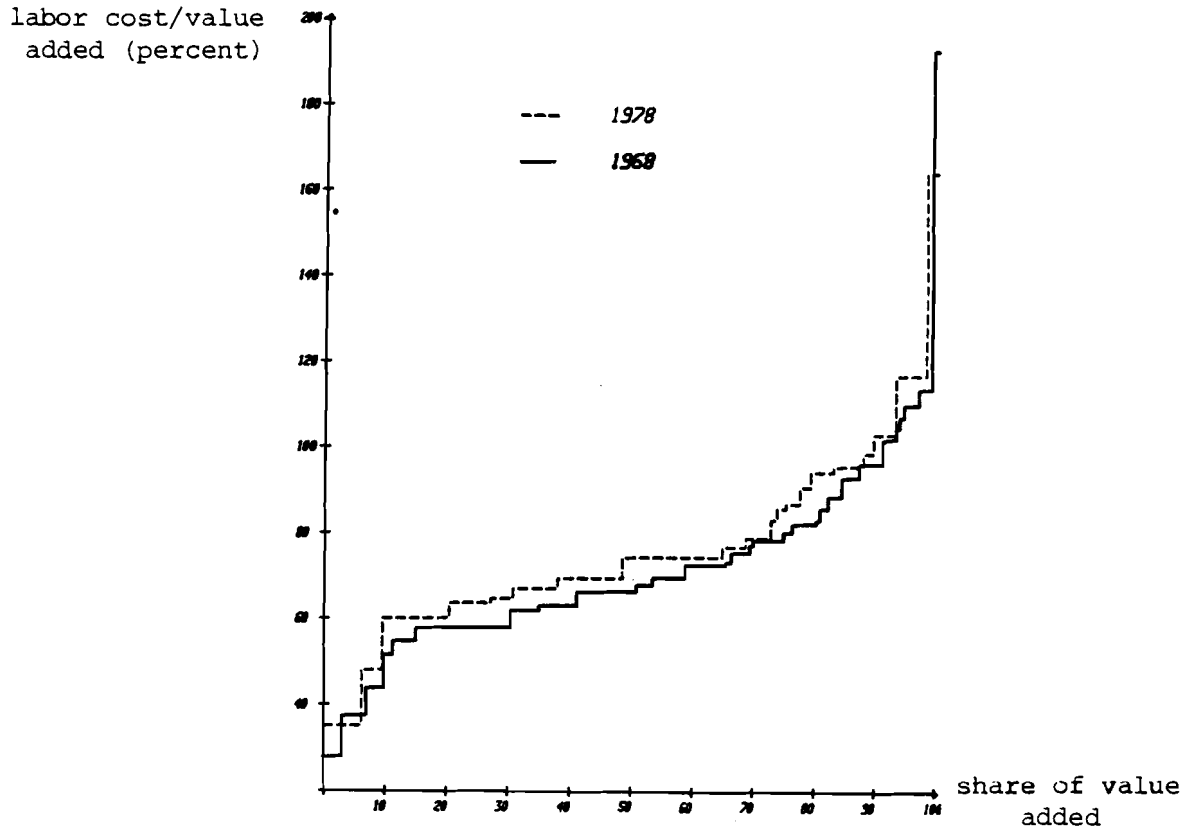


Figure 50. Supply function for graphical industry in Skane. Development 1968-1978.

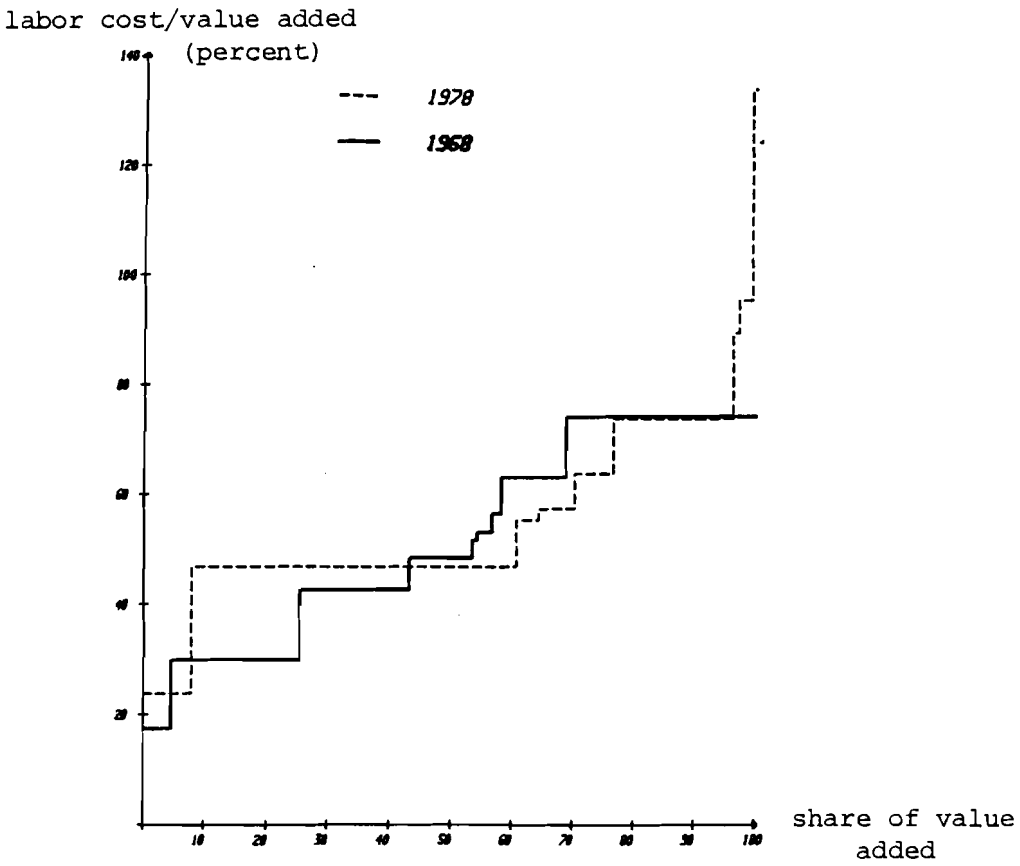


Figure 51. Supply function for the stone and clay industry in south Sweden. Development 1968-1978.

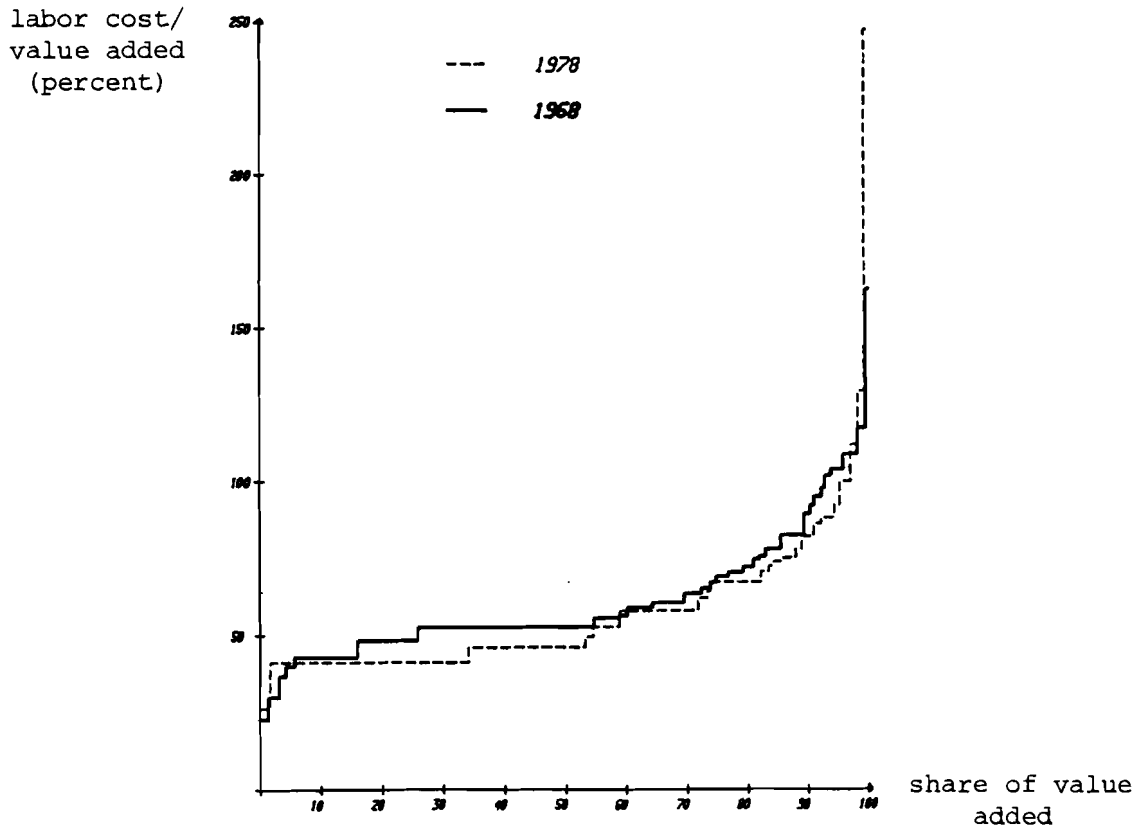


Figure 52. Supply function for wood product industry in south Sweden. Development 1968-1978.

As with the sectors already analyzed we want to elucidate the productivity structure of "other industry" in Skane. Pulp and paper industry excluded, all other sectors belonging to "other industry" have had an equal or better productivity growth in Skane than in the country as a whole. This refers to the period 1968-1978. The results are given in Figures 53 to 56.

The differences in productivity structure for textile industry are minor between Skane and the rest of Sweden. The significant difference is that the Skane sector has a smaller share of its employment at units that cannot cover their labor costs.

The stone, clay and cement industry profits from better productivity and wage-pay capacity in Skane than in the rest of the country in almost all units of the sector. The same goes for the wood industry. The latter sector as a whole has a favorable productivity pattern in Skane with a high wage-pay capacity.

In the graphic industry one observes primarily a lack of highly productive units in comparison to other parts of the country.

Within the pulp and paper industry the best Skane units score higher, productivity-wise, than the corresponding units in other regions.

The following figures demonstrate the so-called static labor demand functions for some parts of the sector "other industry" in Skane. All sectors under consideration are characterized by a lower labor cost sensitivity in Skane than in other parts of Sweden (see Figures 57 and 58). The labor demand in the stone, clay and cement, and in the pulp and paper industries in Skane is especially insensitive to both increases and decreases of the real-term wage level. But even sectors as wood, and graphic phic industry are notably insensitive to wage fluctuations.

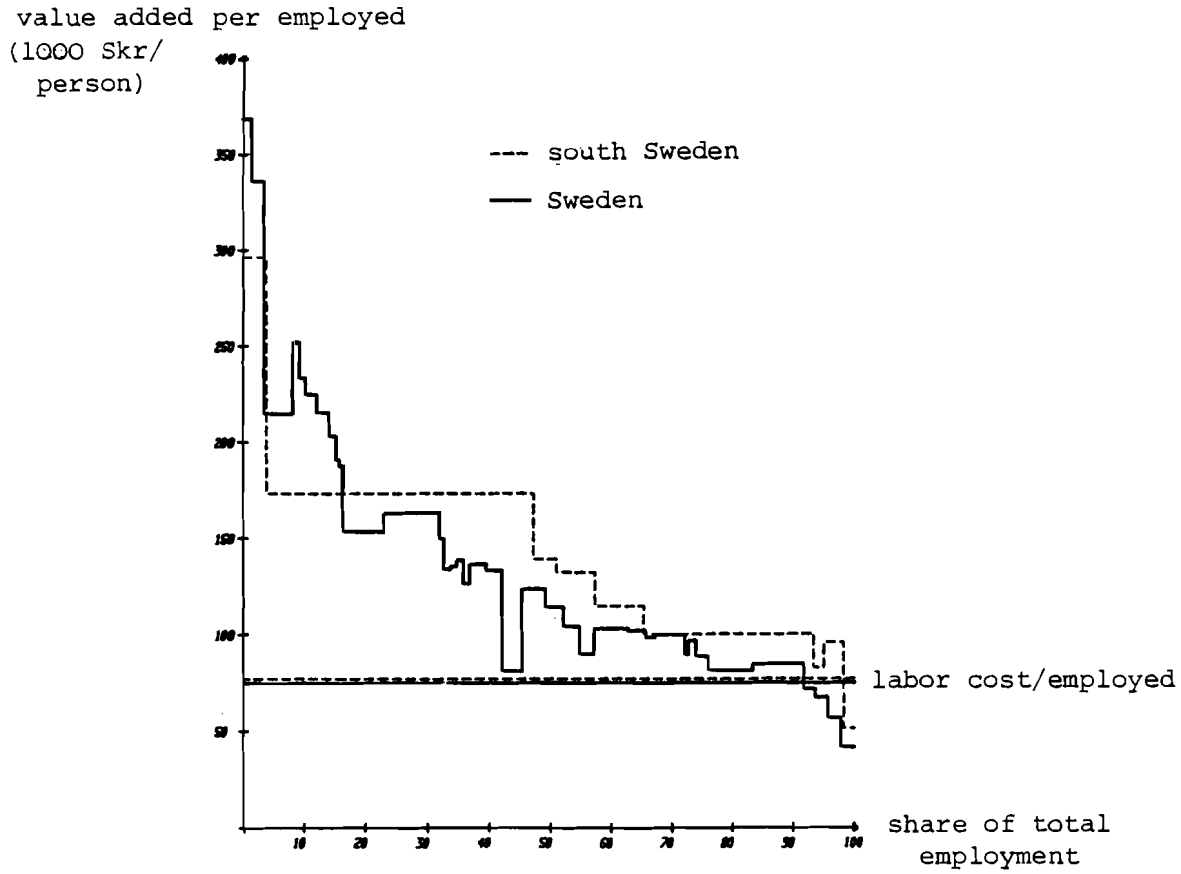


Figure 53. Demand function for the stone and clay industry in south Sweden 1978. Comparison with Sweden as a whole.

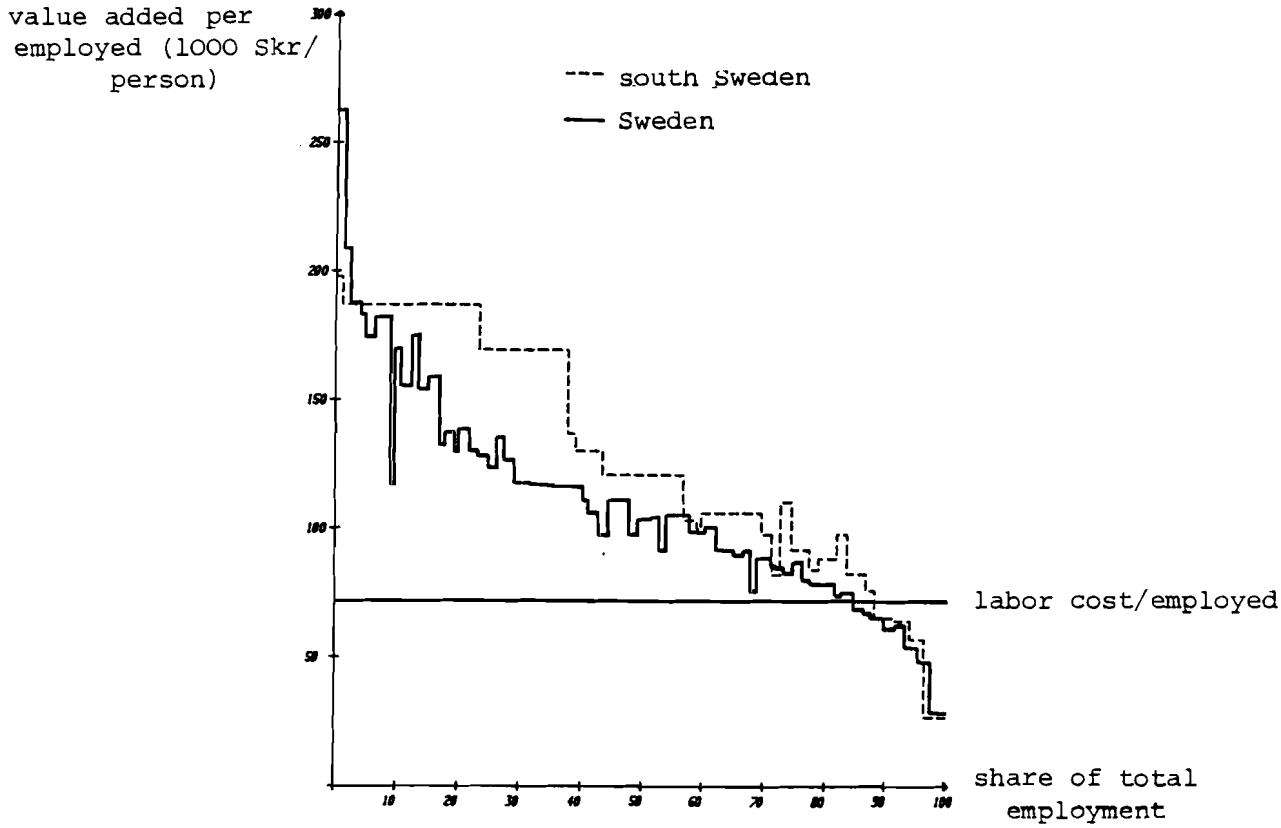


Figure 54. Demand function for wood product industry in south Sweden 1978. Comparison with Sweden as a whole.

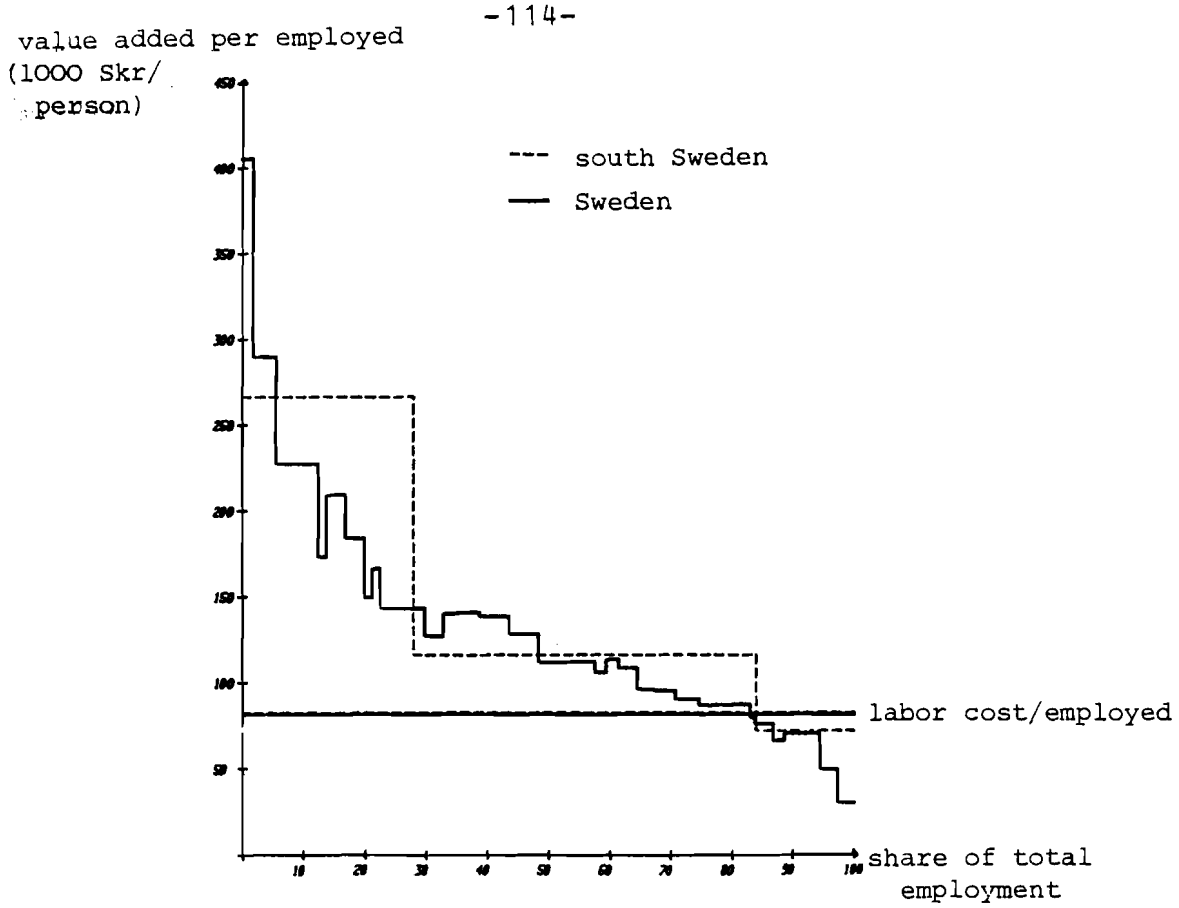


Figure 57. Demand function for the pulp and paper industry in Skane 1978. Comparison with Sweden as a whole.

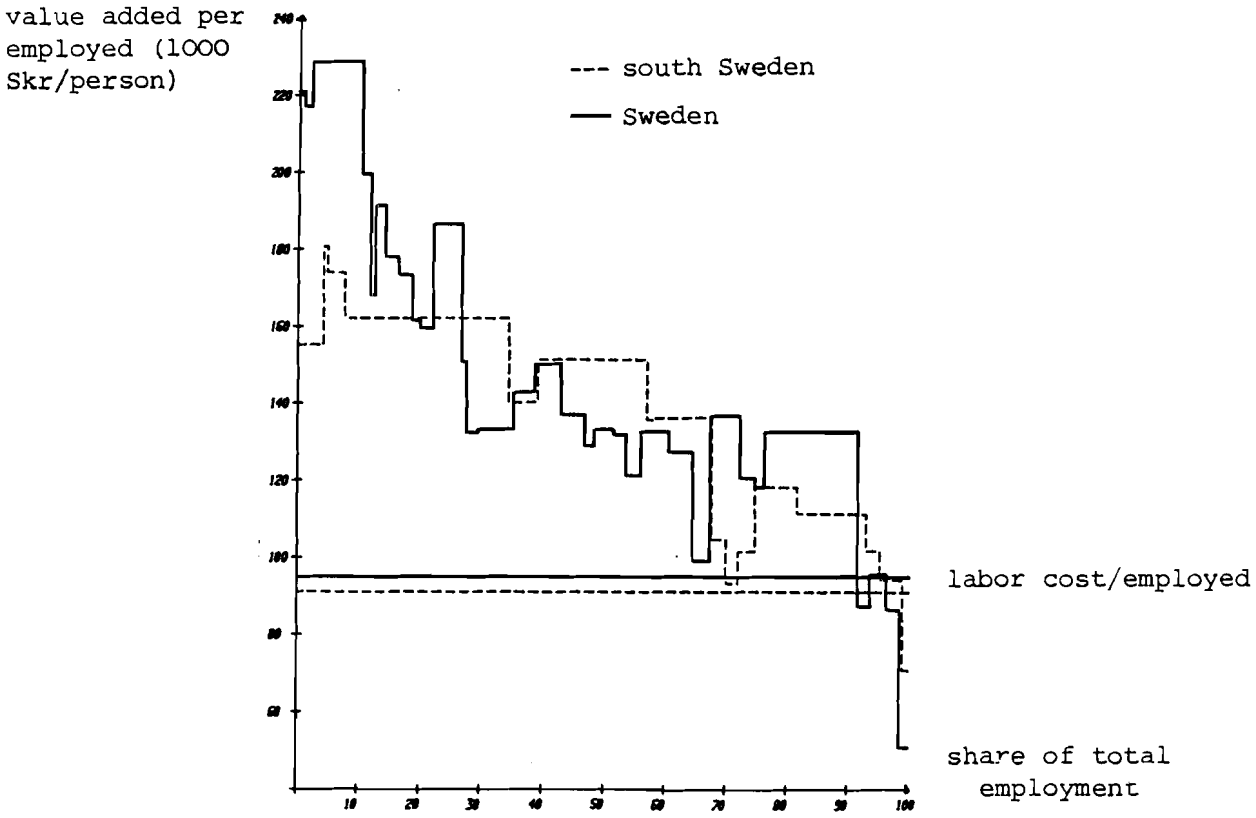


Figure 58. Demand function for the graphical industry in south Sweden 1978. Comparison with Sweden as a whole.

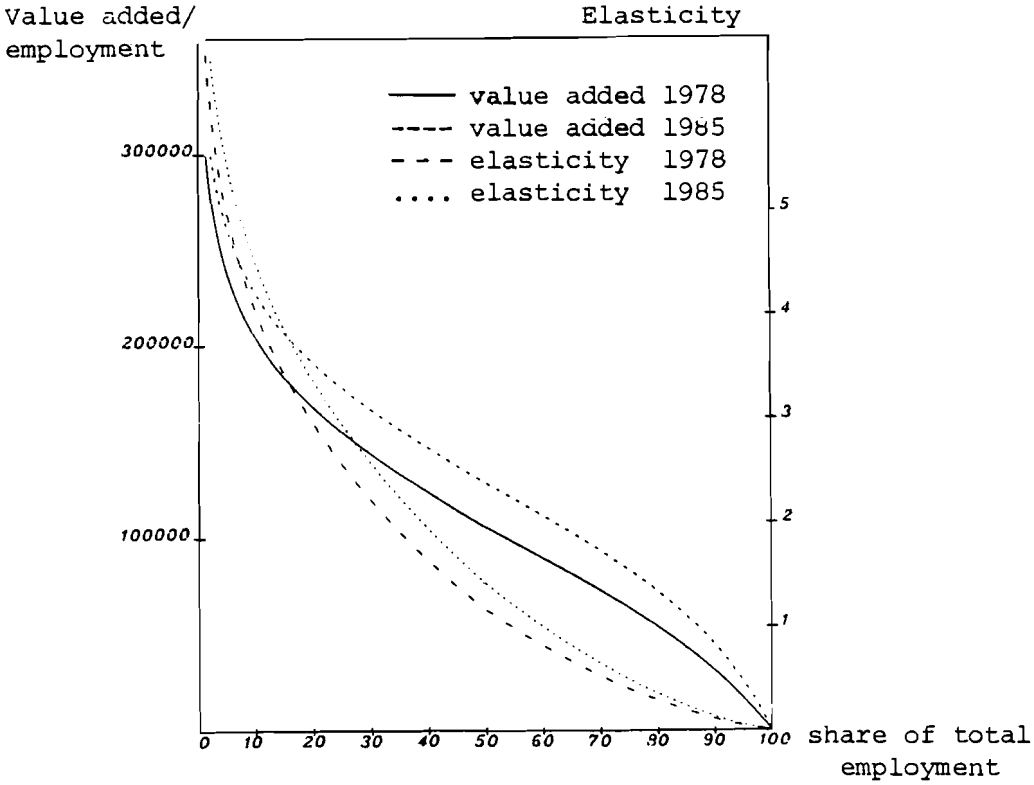


Figure 57. Continuous demand and elasticity function for the stone and clay industry in south Sweden 1968-1978 (1975 prices).

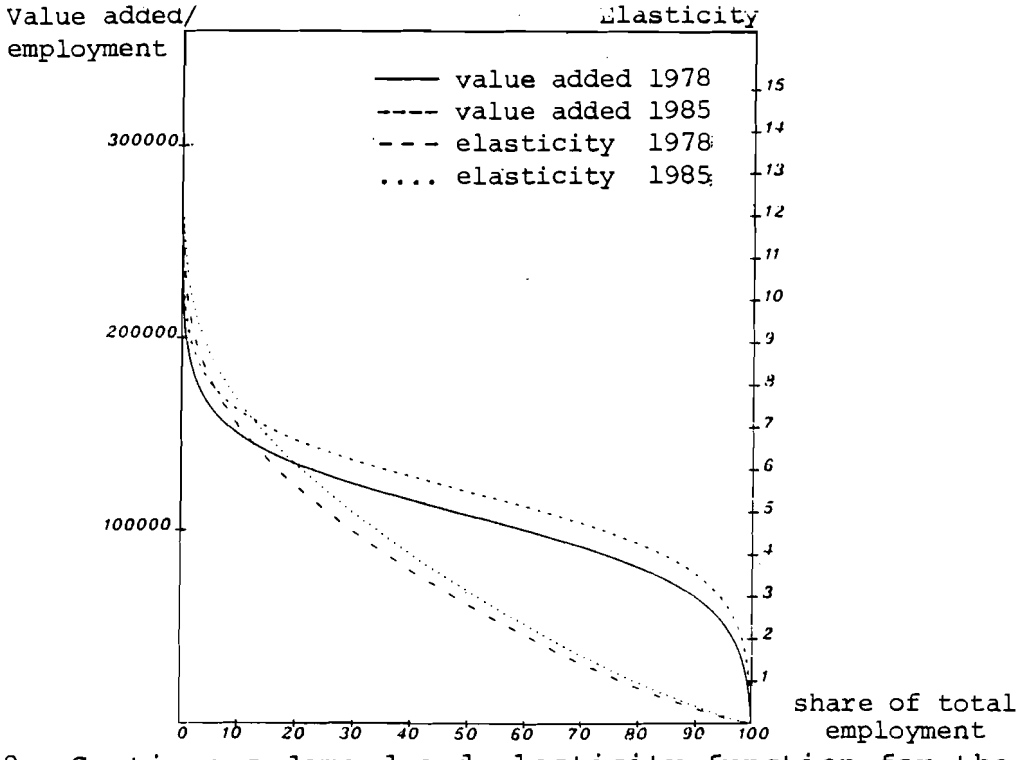


Figure 58. Continuous demand and elasticity function for the graphical industry in south Sweden 1968-1978 (1975 prices).

Thus the food and chemical sectors are not wholly responsible for the insensitivity of the entire industrial labor demand in Skane to labor cost changes. The "other industry" sector also contributes.

6.6 Best-Practice Plants and Their Efficiency Profiles

The heterogenous nature of the sector "other industry" gives rise to a considerable span of its best-practice characteristics. Three subsectors have a low capital-intensity: textile, wood product, and graphical industry. The pulp and paper industry, as well as the stone and clay industry both exhibit high capital-intensities.

The characteristics of new plants in the subsectors of "other industry" have been determined on the basis of best-practice data. As above, average decentile and quartile technologies have been summarized. The current sector's top-ten units have the traits given in Table 48.

Table 48. Best-practice profiles for "other industry" in Skane. Decentile technology (1975 prices).

Industry	Value added (Skr/ employed)	Oil use (m^3/ employed)	Electricity use (TWh/ employed)	Sales (Skr/ employed)
Textile	142 000	2,7	11	484 000
Wood product	192 000	5,2	29	575 000
Graphical	165 000	1,3	8	461 000
Pulp & paper	467 000	53	417	3 270 000
Stone & clay	244 000	119	207	1 120 000

SOURCE: Computations from the data base of the Swedish Industrial Board.

In most sectors the value added per employed in best-practice plants is one hundred percent higher than the average in other industry in Skane in the late 1970s. Table 48 also shows the considerable differences in investment costs for new work-places in subsectors with a high and a low capital-intensity, respectively.

Turning to the somewhat less extreme quartile technology we note some substantial differences in comparing Tables 48 and 49. The latter table shows that a new plant in textile, wood product and graphical industry should get a productivity of 11 000 - 15 000 Skr per employed as a consequence of an investment in the order of 375 000 - 475 000 Skr per work-place.

Table 49 indicates a level of renewal investment costs in the well-developed stone- and clay-industry in Skane of almost 1 million Skr per work-place. Such investments would also tend to increase the energy intensity of the industry in question. It can also be noted that the graphical, and the stone- and clay-industries have an especially high degree of refinery of their products, measured as the ratio between the value added and the sales. Investemtns in these two sectors thus would give rise to relatively strong local demand effects per unit sold.

Table 49. Best-practice profiles for "other industry". Quartile technology (1975 prices).

Industry	Value added (Skr/ employed)	Oil use (m^3/ employed)	Electricity use (MWh/ employed)	Investment cost (Skr/ employed)	Sales (Skr/ employed)
Textile	109 000	3,6	12	374 000	209 000
Wood product	155 000	4,3	28	465 000	326 000
Graphical	150 000	1,3	8	421 000	203 000
Pulp & paper	371 000	37	410	2 600 000	794 000
Stone & clay	209 000	78	105	960 000	342 000

SOURCE: Computations from the data base of the Swedish Industrial Board.

6.7 Summary of Basic Facts

- The sector "other industry" in Skane comprises five main branches each housing an employment between 5000 and 7000. The subsectors are: graphical industry, wood product, textile, stone and clay, and pulp and paper industry.
- The sector "other industry" as a whole is characterized by a slow growth both nationally and internationally.
- The number of production units has decreased by around 130 during the 1970s.
- The forest industry which is a part of the sector other industry in Skane has had a stable level of employment during the 1970s.
- All subsectors of "other industry" in Skane have had a more favorable development of the productivity than the corresponding sectors at the national level. This holds for the whole period 1968-1979.
- In a short-term perspective, some 2500 production units are threatened by a shut-down in Skane. Almost half of these belong to the textile industry.
- In a long-term perspective, the renewal efforts in Skane's "other industry" sector should involve some 10 000 employed. The production in the units holding the employment has not lead to a coverage of fixed capital costs during the latter part of the 1970s.
- The sector "other industry" has a very heterogeneous capital and land intensity. Its total land use in Skane amounts to some 1200 hectares according to our calculations.
- An increased land demand of some 10-15 hectares per year may be foreseen to allow for the long-term renewal of the "other industry" sector, keeping its employment at the current level.
- The electricity use in Skane's "other industry" amounts to some 1TWh per year. The most electricity-intensive parts of the sector use up almost 200 MWh per manyear.
- The subsectors of "other industry" in Skane generally have more favorable productivity and cost patterns than in other parts of Sweden.

- The labor demand in the sector "other industry" in Skane is less wage-sensitive than in other parts of Sweden. The labor demand is thus more stable to variations in the domestic cost level than in the rest of Sweden.

REFERENCES

Försund, F. and L. Hjalmarsson (1978) Technical Progress and Structural Efficiency in Swedish Dairy Plants, in The Importance of Technology and the Permanence of Structure in Economic Growth, IVI, Stockholm.

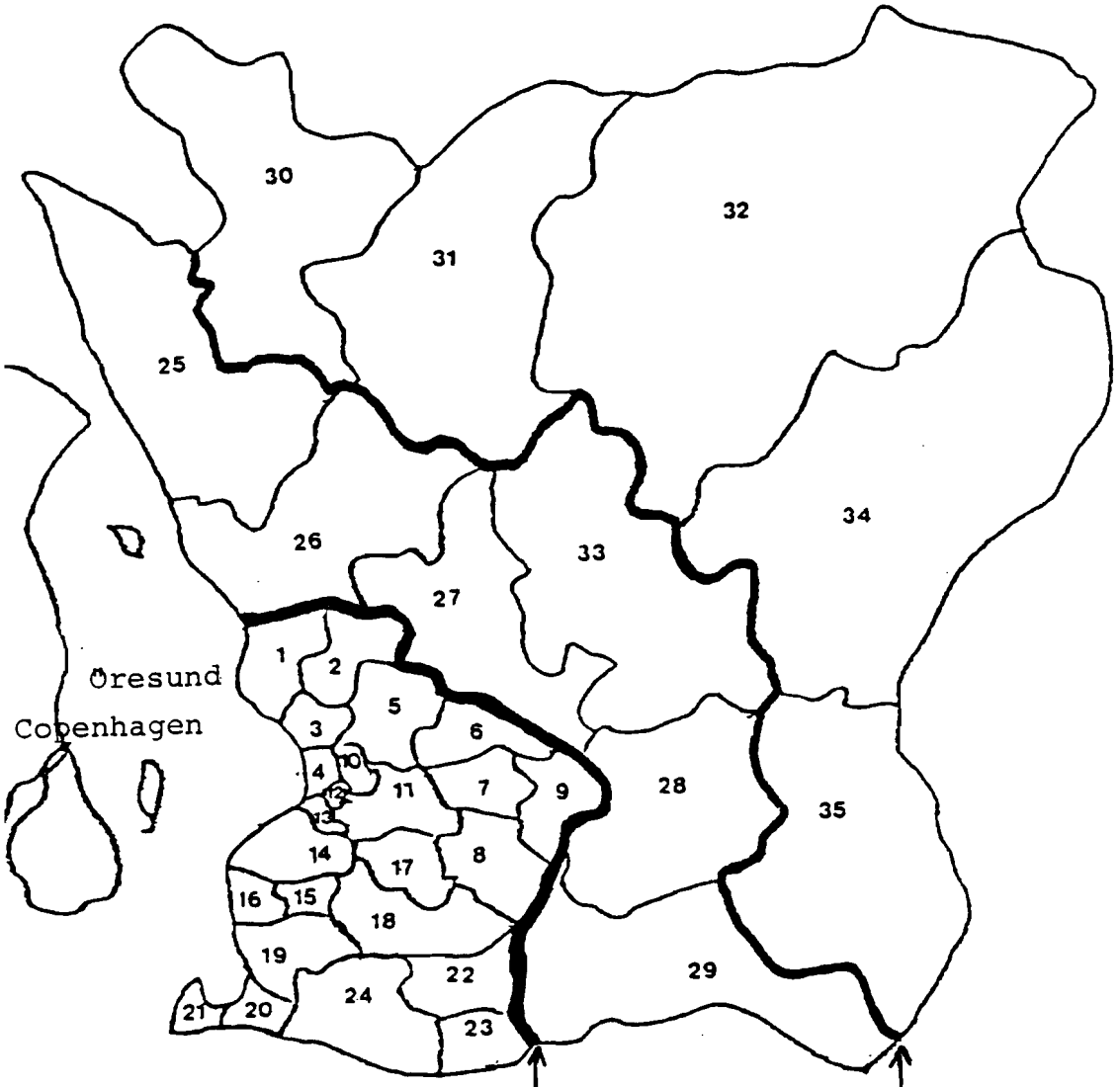
Johansson, B. and U. Strömqvist (1980) Profits and employment in Swedish industry. SIND Report 1980:2. Liber, Stockholm (in Swedish).

Johansson, B. and U. Strömqvist (1981) Regional rigidities in the process of economic structural development. Regional Science and Urban Economics, Vol.11 pp.336-375.

Strömqvist, U. and A. Karlqvist (1982) Where comes the crisis? A Regional and Sectoral Analysis of the Structural Change Needs in Swedish Industry During the 1980s. SIND Report 1982:3. Liber, Stockholm (in Swedish).

7. APPENDIX

The zonal subdivision here is used in all the work within the southwest Skane case study. By means of the figure, the names mentioned in the text above may be located geographically.



1	Löddeköpinge	10	Hjärup	22	Anderslöv
2	Kävlinge	11	Staffanstorp	23	Smygehamn
3	Bjärred	12	Åkarp	24	Trelleborg
4	Lomma	13	Arlöv	25	Helsingborg
5	Lund	14	Malmö	26	Landskrona
6	Sandby	15	Oxie	27	Eslöv
7	Dalby	16	Bunkeflo	28	Sjöbo
8	Genarp			29	Ystad
9	Veberöd	17	Bara	30	Ängelholm
		18	Svedala	31	Klippan
				32	Hässleholm
		19	Vellinge	33	Höör-Hörby
		20	Höllviksnäs	34	Kristianstad
		21	Skanör-Falsterbo	35	Simrishamn